

CHAPTER V.

IRON.

INTRODUCTION.

Definitions and explanations.—In order that the text and tables of this report may be entirely clear, the following definitions and explanations are presented:

Scope of census.—The statistics of iron mining relate to the United States exclusive of all outlying possessions. The Thirteenth Census did not extend to the Philippine Islands nor were iron mines reported from the other noncontiguous territory of the United States.

The census returns cover two general classes of operations: First, those which produced iron ore during the year 1909, and second, those which were in course of development during that year. In a few cases, however, where an operator controlled a number of mines, some of which were producing and some nonproducing, the expenses of development of the nonproducing mines have been included in the expenses of the producing enterprises.

Period covered.—The returns for the iron mines cover the calendar year 1909 or the business year which corresponded most nearly to that calendar year, with the exception of those mines which operated only a portion of the year.

Number of operators.—In determining the number of operators in the United States subsidiary companies have not been considered separate operators, but each holding or owning company, together with all its subsidiary concerns in any part of the United States, has been counted as one operator. In the statistics for districts or states, however, enterprises situated in different districts or states, though controlled by the same operator, were counted as separate operators.

Capital.—The operators were required to report the total amount of capital, both owned and borrowed, which they had invested in the business on the last day of the business year. However, the accuracy of the returns to this inquiry is open to question, owing to the fact that the valuation of mining properties contains an element of uncertainty inherent in the estimate of the value of the ore deposit. Again, a considerable proportion of the mining properties form a part of larger enterprises which combine mining with the manufacture of iron and steel, and the segregation of capital in such instances is often a matter of estimate with the operator.

Expenses.—The expenses reported include all direct expenses of operation and development. Interest payments are not included, nor has any allowance been made for depreciation.

Salaries.—The amount of salaries shown includes all payments to officers, superintendents, managers, and salaried employees in general offices, as well as the payments to salaried employees at the mines.

Wages.—The wages shown in the tables of this report represent the net earnings of the men. The census schedule called for the amount of net wages; that is, the amount remaining after deductions had been made from the gross earnings on account of blacksmithing, explosives, oil, etc., furnished by the operators, and also called for the amount of such deductions made. Deductions aggregating \$1,207,772 were reported by the operators, and an examination of the returns, as well as correspondence with the operators in cases

where there was doubt as to the method pursued, showed that the operators had deducted the charges in all cases where they had reported the same. Some operators who reported no charges to the men furnished all supplies free of charge. The amount expended for supplies of this nature, whether charged to the men or not, is included in the item of supplies and materials. In cases where the operator failed to include the same in supplies and materials the amount was ascertained by correspondence.

Supplies and materials.—This item covers all materials and supplies of every description, including fuel used for any purpose in connection with the operation or development of the iron mines. It includes the cost of the following materials: Lumber and timber used for repairs, mine supports, track ties, and all other purposes; iron and steel for blacksmithing; rails, frogs, sleepers, etc., for tracks and repairs; renewals and repairs of tools; explosives and oil used directly or sold to employees; water for boilers and other purposes; machinery, supplies; etc. It also includes freight (if any) paid on materials. The amount expended for fuel by iron mines in 1909 includes an insignificant amount paid for rent of power, which formed about 1 per cent of the total power used in 1909.

Miscellaneous expenses.—The figures for miscellaneous expenses include royalties and rent of mines, taxes, cost of contract work, rent of offices, use of patents, insurance, ordinary repairs to buildings and machinery, advertising, damages, traveling expenses, and all other sundry expenses.

Value of products.—The schedule called for the value of products at the mine. However, the value reported was probably not always the actual value which would have resulted from sales in the open market, since a considerable part of the output of iron mines was produced by operators affiliated with blast furnaces or other industrial enterprises, and the value reported by such operators may have been a matter of intercorporate accounting rather than an expression of market value. The value of products reported is that of the ore used and sold, and not the value of the ore actually mined. This value also includes the value of by-products, most of which was manganiferous ore.

Persons engaged in the industry.—The statistics of the number of operators, salaried employees, and wage earners are based on the returns for December 15, 1909, or the nearest representative day. The number of wage earners reported includes overseers performing work similar to that of men over whom they had charge, but foremen whose duties were wholly supervisory are included among salaried employees.

Primary horsepower.—The figures given under this heading represent the total primary power generated by steam engines, gas or gasoline engines, and water wheels owned by the operators. They are exclusive of a small quantity of rented electric power which was reported by two operators and amounted to but slightly over 1 per cent of the total power used. The horsepower of electric motors run by current generated by the primary power of the mine operators is not included, since this would obviously result in duplication.

MINES AND QUARRIES.

GENERAL SUMMARY: 1909.

Producing mines—General summary, by districts.—The following summary presents, by districts, the principal statistics for producing iron mines in 1909. The Lake Superior district, which comprises Minnesota, Wisconsin, and Michigan, and the Southern district, which comprises Alabama, Georgia, and Tennessee, were the principal producing districts, the combined production of these two districts representing 91.9 per cent of the total tonnage of ore used by the operators in their own blast furnaces or sold in the market.

Table 1

PRODUCING IRON MINES: 1909

	United States.	Lake Superior district. ¹	Southern district. ²	Other states. ³
Number of operators.....	176	38	47	95
Number of mines.....	483	195	116	172
Persons engaged in industry...	55,176	35,886	8,629	10,661
Proprietors and firm members.....	76	.....	15	61
Salaried employees.....	2,870	2,088	474	308
Wage earners.....	52,230	33,798	8,140	10,292
Primary horsepower owned.....	342,069	262,305	40,915	38,849
Capital.....	\$300,735,917	\$237,386,821	\$28,475,259	\$34,873,837
Expenses of operation and development.....	\$74,071,830	\$61,552,979	\$5,762,991	\$6,755,860
Services.....	\$33,121,418	\$25,236,687	\$3,797,740	\$4,086,991
Salaries.....	\$3,389,962	\$2,628,989	\$428,043	\$332,030
Wages.....	\$29,731,456	\$22,607,698	\$3,369,697	\$3,754,061
Supplies and materials.....	\$17,229,717	\$13,901,022	\$1,353,956	\$1,971,739
Royalties and rent of mines.....	\$15,174,735	\$14,784,131	\$136,723	\$253,881
Contract work.....	\$2,698,842	\$2,613,823	\$5,700	\$79,319
Taxes.....	\$3,970,355	\$3,818,377	\$46,979	\$104,999
Rent of offices and sundries.....	\$1,876,763	\$1,198,939	\$418,893	\$258,931
Iron ore:				
Gross production (long tons).....	51,947,129	42,095,627	5,556,838	4,294,664
Production after concentration.....	51,717,920	42,095,627	5,556,838	4,065,455
Used and sold—				
Quantity (long tons).....	50,521,208	41,242,374	5,181,605	4,097,229
Value (including by-products).....	\$106,947,082	\$92,216,852	\$6,085,508	\$8,644,722
Average per operator:				
Number of mines.....	3	5	2	2
Salaried employees.....	16	55	10	3
Wage earners.....	297	889	173	108
Tons used and sold.....	287,052	1,085,326	110,247	43,129
Average per mine:				
Wage earners.....	108	173	70	60
Primary horsepower.....	708	1,345	353	226
Tons used and sold.....	104,599	211,409	44,669	23,821

¹ Embraces Michigan, Minnesota, and Wisconsin.

² Embraces Alabama, Georgia, and Tennessee.

³ Embraces Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, Nevada, New Mexico, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming.

⁴ The difference of four between the total number of operators for the United States and the sum of the numbers for the districts and "Other states," is due to the elimination of the duplication in the United States total of those operators who had mines in more than one district.

There were 176 operators of iron mines in the United States in 1909. Where a number of mining properties were controlled by a holding company and operated through subsidiary companies, this holding company, together with all its subsidiaries, was counted as one operator.

The number of iron mines in the United States in 1909 was 483. The number of persons engaged in the industry, December 15, 1909, or the nearest representative day, was 55,176, of whom 52,230 were wage earners. The expenses of operation and development were \$74,071,830, of which the payments for

salaries and wages constituted somewhat less than half. The production of iron ore in crude form was 51,947,129 tons, but some of the ore produced in New York (882,548 tons) was concentrated at the mines, and the net production for the country as a whole after this concentration was 51,717,920 tons. It has been found impossible to assign any value to the ore produced which was added to the stock at the mine or lake port. The quantity used by blast furnaces at the mines or shipped from the mines for use in affiliated blast furnaces at a distance or for sale was 50,521,208 tons, and its value at the mine was \$106,539,574, besides which manganiferous ore and other by-products to the value of \$407,508 were produced, making the total value of products \$106,947,082.

It should be noted that in some later tables the gross production of iron ore is shown; in some, the production after concentration; and in some, the quantity used and sold. The differences in practice in this respect depend upon the purpose of each table, and, particularly in certain cases, are determined by the nature of the figures for previous censuses with which comparison must be made.

The predominance of the Lake Superior district in the iron-mining industry is shown conspicuously by Table 1. More than four-fifths of the ore used and sold in 1909 came from this district, and the value of this ore, including by-products, represented nearly seven-eighths of the total for the country.

An examination of Table 1 shows that the scale of production in the Lake Superior district was much larger than that in the Southern district or in "Other states." In the Lake Superior district the average number of salaried employees per operator was 55, while in the Southern district it was only 10 and in "Other states," only 3. In the Lake Superior district the average number of wage earners per operator was 889, as compared with 173 in the Southern district and 108 in the rest of the country. The average output (based on the ore used and sold) per operator in the three divisions shows a still greater contrast. In the Lake Superior district the average was nearly ten times as great as in the Southern district and more than twenty-five times as great as in all the other states taken together. The contrast between the districts in respect to the scale of operations was due only in part to greater concentration of ownership, the average number of mines per operator in the Lake Superior district being 5, whereas in the Southern district and in "Other states" it was 2. On the average,

a mine in the Lake Superior district gave employment to more than twice as many wage earners as one in the Southern district and to nearly three times as many as one in "Other states," while the average production (amount used and sold) per mine in the Lake Superior district was nearly five times as great as that in the Southern district and nearly nine times as great as that in the rest of the country. In the Lake Superior district the use of mechanical power was also much more extensive than elsewhere, the average primary horsepower in that district being 1,345 per mine, in the Southern district 353, and in "Other states" 226.

Table 2 shows the output of iron ore in the United States and in the five iron-mining states, with a production in 1909 of more than 1,000,000 tons.

STATE.	IRON ORE USED AND SOLD: 1909	
	Quantity (long tons).	Per cent of total.
United States.....	50,521,208	100.0
Minnesota.....	28,314,713	56.0
Michigan.....	11,924,995	23.6
Alabama.....	4,312,360	8.5
New York.....	1,024,173	2.0
Wisconsin.....	1,002,600	2.0
All other states.....	3,942,301	7.8

Producing and nonproducing enterprises.—A certain amount of development work is incidental to the

operation of every mine. In the report for the operations of each mine were included the number of wage earners employed on development work, their wages, the cost of supplies and materials used, and other incidental expenses of such work. In addition to producing mines, there were some mines where development work only was carried on. Table 3 shows the relative importance of producing and nonproducing enterprises.

	IRON MINES: 1909		
	Total.	Producing enterprises.	Nonpro- ducing enterprises.
Number of operators.....	191	176	119
Land controlled, acres.....	1,343,634	1,313,214	30,420
Average per operator.....	7,035	7,461	1,601
Capital.....	\$305,586,756	\$300,735,917	\$4,850,839
Expenses of operation and develop- ment.....	\$74,934,131	\$74,071,830	\$862,301
Wage earners.....	52,983	52,230	753
Average per operator.....	277	297	40

¹ Includes 4 operators who also operated producing mines.

The preceding table shows that nonproducing mines operated as separate enterprises represented a very small part of the iron-mining industry. They were also much smaller than the producing properties. The average number of wage earners per operator was 297 for producing and only 40 for nonproducing enterprises.

PROGRESS OF THE INDUSTRY.

Summary for producing mines in the United States: 1879-1909.—Table 4 presents for producing iron mines, in the United States as a whole, all comparable statistics as reported at the Thirteenth and the three preceding censuses.

CENSUS YEAR.	PRODUCING IRON MINES.									
	Salaries and wages.	Cost of supplies and materials.	Gross quantity of ore produced (long tons).	Total steam power (horse- power).	Per cent of increase over preceding census.				Average expendi- ture per ton for—	
					Salaries and wages.	Supplies.	Ore produced.	Steam power.	Salaries and wages.	Supplies and materials.
1909.....	\$33,121,418	\$17,220,717	51,947,120	320,753	40.1	92.0	46.1	217.0	\$0.04	\$0.33
1902.....	23,641,600	8,973,108	35,567,410	102,878	04.1	79.5	145.0	77.4	0.06	0.25
1889.....	14,400,151	4,908,988	14,518,041	57,976	51.1	72.7	130.2	104.0	0.09	0.34
1879.....	9,538,117	2,894,011	6,307,883	28,422	.....	.....	.....	.....	1.51	0.46

¹ Horsepower of steam engines.

² Horsepower of steam boilers.

³ Exclusive of the production of irregular producers.

This table shows an exceedingly rapid increase in the iron-mining industry. The gross amount of ore produced was more than eight times as great in 1909 as in 1879, and the expenditure for salaries and wages about three and a half times as great. The production of ore more than doubled between 1879 and 1889, and again more than doubled between 1889 and 1902,

while between 1902 and 1909 there was an increase of 46.1 per cent.

The amount expended per ton for services decreased greatly from 1879 to 1902, but remained practically stationary from 1902 to 1909. On the other hand, the cost per ton of supplies and materials decreased considerably between 1879 and 1902, but increased from \$0.25 to \$0.33 between 1902 and 1909. The increase in the average expenditure for supplies and materials was apparently due to the increased use of mechanical power, but, as the increase in the quantity of ore produced did not keep pace with this increased use of mechanical power, it is probable that the expenditure for services in 1909 represented compensation for a smaller amount of labor than in 1902, as is further shown by Table 12.

The increase in the use of mechanical power is the most conspicuous feature of the development of iron mining brought out by Table 4. The horsepower shown in Table 4 for 1879 and 1889 represents the rated power of steam boilers, while that reported for 1902 and 1909 represents the rated power of steam engines. It must be borne in mind that the power of a boiler is always greater than that of the engine to which it supplies steam. The rate of increase from 1889 to 1902 was, accordingly, greater than that indicated by Table 4.

The increase in the number of steam engines and their horsepower is shown in Table 5.

Table 5								STEAM ENGINES USED IN PRODUCING IRON MINES.	
CENSUS YEAR.	Number of engines.			Horsepower.			Average horsepower per engine.		
	Number.	Increase over preceding census.		Amount.	Increase over preceding census.				
		Number.	Per cent.		Amount.	Per cent.			
1909	3,563	2,431	214.8	326,753	233,875	217.6	92		
1902	1,132	311	37.9	102,878	78,040	314.2	91		
1879	821			24,838			30		

The absolute and relative increases in the number and horsepower of steam engines during the 7 years from 1902 to 1909 were far greater than during the preceding 23 years.

The progress in the use of mechanical power since 1902 has manifested itself not only in the increased use of steam power but also in the utilization of new sources of power. At the special census of 1902 the use of gas engines and water wheels was negligible, while in the seven years from 1902 to 1909 there was considerable development of these sources of power, although even in 1909 they were still comparatively unimportant. Moreover, there was a marked increase in the utilization of electric motors as a means of applying primary power. Table 6 presents comparative statistics of mechanical power, classified according to character.

Table 6	Cen- sus year.	PRODUCING IRON MINES.				
		Primary power. ¹				Electric motors run by current generated by enter- prise using.
		All classes.	Steam engines.	Gas or gasoline engines.	Water wheels.	
Number	1909	3, 620	3, 563	27	30	326
	1902	1, 154	1, 132	11	11	35
Horsepower	1909	342, 069	326, 753	2, 651	12, 665	13, 295
	1902	103, 974	102, 878	86	1, 010	937
Per cent of increase. Average per engine, etc.		229. 0	217. 6	2, 982. 6	1, 154. 0	1, 318. 9
	1909		92	98	422	41
	1902		91	8	92	27

¹ Exclusive of a small amount of rented electric power reported by two operators.

² Includes 1 water motor of 115 horsepower.

In 1902 one unit of horsepower was used for every 342 gross tons mined, as compared with one for every 152 gross tons mined in 1909, and during the seven years the horsepower per mine increased from 198 to 708. It must, however, be kept in mind, that the power actually used is less than the rated horsepower of engines and other motors. These figures, therefore, do not necessarily represent precisely the increase in the amount of power actually used. The table shows not only a great increase in the number of each class of power generators, but also a marked increase in the average horsepower of gas engines and water wheels.

The utilization of water power was practically confined to the state of Michigan, while Pennsylvania and New York employed 92.8 per cent of the total power supplied by gas and gasoline engines. Michigan and Minnesota are the only states in which extensive use is made of electric motors.

The accuracy of the returns concerning capital made by the mine operators in reply to census inquiries is open to question. The valuation of a mining property contains an element of uncertainty inherent in the estimate of the value of the ore deposit. Moreover, a large proportion of the mining properties form part of larger enterprises which combine mining with the manufacture of iron and steel products, and the segregation of the capital for the mines is often a matter of estimate. It was deemed advisable at the special census of 1902 to omit the inquiry concerning capital, but this inquiry was required by law in 1909. A comparison of the capital with the quantities of ore produced, as reported for 1879, 1889, and 1909, is presented in Table 7. The ratio of capital reported to the quantity of ore produced declined from about \$10 per ton in 1879 to about \$8 per ton in 1889 and to about \$6 per ton in 1909. It is worthy of note that in Minnesota the returns for capital, amounting to 58.1 per cent of the total for the United States, were considerably less than the assessed valuation of iron-mining properties. The total capital on December 31, 1909, or at the end of the business year corresponding most nearly to the calendar year 1909, was \$174,863,000, although the assessed valuation of iron-mining properties in the state in 1909 was \$200,593,578.¹

Table 7 PRODUCING IRON MINES.				
CENSUS YEAR.	Capital.	Gross quantity of ore mined (long tons).	Per cent of increase over preceding census.	
			Capital.	Ore mined.
1909.....	\$300,735,917	51,947,129	174.0	257.8
1889.....	109,766,199	14,518,041	77.7	130.2
1879.....	61,782,287	6,307,883		

There are no comparable statistics of the number of wage earners at different censuses. The number reported for 1879 was called the average number, but the method by which this average was obtained by different operators was not explained in the report for that census. For 1889 the average number reported was computed by dividing the sum of the numbers employed each month by the number of months during which the mine was in operation. The total for 1889 purported to include also wage earners employed by contractors and subcontractors, but as these figures were reported by operators who did not directly employ the men the returns could not have been accurate. At the special census of 1902 the sum of the average numbers reported for each month during which the mine was in operation

¹ Report of Minnesota Tax Commission, 1910.

was divided by 12 and the result taken to represent the average number employed throughout the year, while at the census of 1909 no attempt was made to obtain the average number for the year, the actual number employed on the 15th day of each month or the nearest representative day being ascertained. While it is therefore impossible to make comparisons between the absolute numbers for the different censuses, the distribution of the reported number of wage earners between those employed above ground and those employed below ground is affected in only comparatively slight degree by the change in the method of reporting the number of wage earners. The distribution at each census was as follows:

Table 8

CENSUS YEAR.	PER CENT OF WAGE EARNERS IN PRODUCING MINES EMPLOYED—	
	Above ground.	Below ground.
1909.....	47.7	52.3
1902.....	40.6	59.4
1889.....	47.7	52.3
1879.....	54.0	46.0

The percentages relating to the employment in the mines of boys under the age of 16 are likewise fairly comparable. In 1879, 5.2 per cent of all wage earners in iron mines were boys under 16; in 1889, 2.2 per cent; in 1902, 1.3 per cent; and in 1909 only 0.9 per cent.

Comparison of ore production and pig-iron production, by five-year periods: 1890-1909.—As appears from Table 9, compiled from the annual reports of the United States Geological Survey,¹ the 20-year period between 1889 and 1909 witnessed the utilization of lower-grade ores. The percentage which the quantity of pig iron produced formed of the estimated consumption of iron ore shows a regular decline during each five-year period. As the great bulk of the ore consumed is domestic ore, this decline must be attributed to a change in the grade of such ore.

Table 9

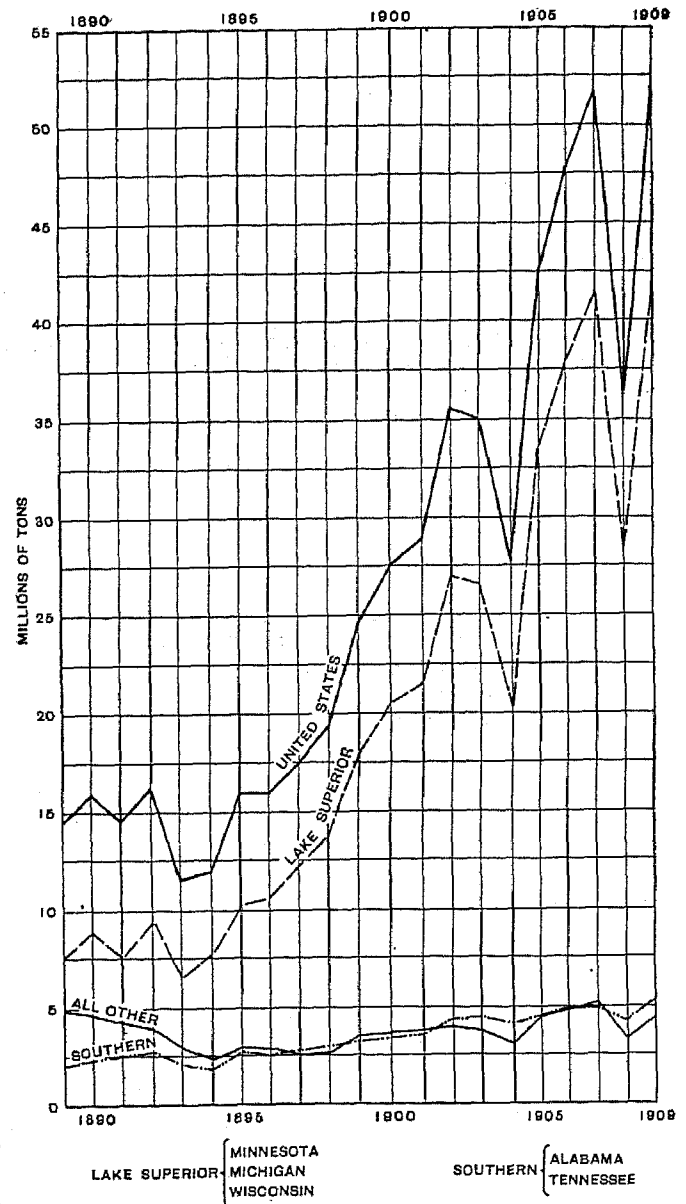
PERIOD.	Domestic production of iron ore (long tons).	Apparent consumption of iron ore (long tons).	PIG IRON PRODUCED.		
			Quantity (long tons).	Per cent of—	
				Apparent consumption.	Domestic production.
1890-1894.....	70,391,195	71,028,506	40,421,463	56.9	57.4
1895-1899.....	93,597,998	96,871,074	53,116,752	55.0	56.7
1900-1904.....	154,658,413	156,423,984	81,995,188	52.4	53.0
1905-1909.....	229,274,087	229,224,029	115,812,421	50.5	50.5

Annual production of iron ore, by states: 1879-1909.—Table 10, compiled from the census reports and from the annual reports of the United States Geological Survey for intercensal years since 1889, shows the development of iron mining in the United States since 1879. The data presented in that table

¹ Mineral Resources of the United States, 1909, Part I, p. 80.

are shown graphically by Diagrams 1, 2, and 3. The curve shows the production of iron ore in the United States, in the Lake Superior and Southern districts, and in "All other states," from year to year. The bar diagram shows the growth of production of iron ore in the principal states by decennial periods from 1879 to 1909. The circle shows the comparative importance of the iron mining states in 1909.

DIAGRAM 1.—PRODUCTION OF IRON ORE—UNITED STATES AND PRINCIPAL PRODUCING REGIONS: 1890-1909.



In 1879 Pennsylvania was the principal iron-mining state, and Michigan held second place, followed by New York and New Jersey; the industry in Alabama was in its infancy, and no iron mining was reported for Minnesota. The production of ore doubled during the decade 1879-1889, the increase being due chiefly to the development of the Lake Superior district, but partly to increased activity in the industry in Alabama and Tennessee. In 1889 Pennsylvania was outranked by Michigan and Alabama in the

production of iron ore. In the 20-year period from 1889 to 1909 the production of iron ore increased from 14,500,000 to 52,000,000 tons, the increase being due primarily to the remarkable development of the in-

dustry in Minnesota and Michigan and to its continued development in Alabama. During this period Pennsylvania showed a decline of 57.3 per cent in its production of iron ore.

Table 10	IRON ORE MINED (THOUSANDS OF TONS).										YEAR.	IRON ORE MINED (THOUSANDS OF TONS).									
	United States.	Minnesota.	Michigan.	Wisconsin.	Alabama.	Tennessee.	New York.	Pennsylvania.	New Jersey.	All other states.		United States.	Minnesota.	Michigan.	Wisconsin.	Alabama.	Tennessee.	New York.	Pennsylvania.	New Jersey.	All other states.
1879.....	7,120	.....	1,641	37	171	93	1,127	1,951	676	1,424	1899.....	24,683	8,161	9,146	580	2,663	632	444	1,009	256	1,792
1880.....	14,518	865	5,859	837	1,570	473	1,248	1,560	416	1,693	1900.....	27,553	9,534	9,927	746	2,759	594	441	878	344	2,030
1890.....	16,036	892	7,142	949	1,698	466	1,253	1,362	496	1,578	1901.....	28,887	11,110	9,654	739	2,802	789	420	1,041	402	1,930
1891.....	14,591	945	6,127	589	1,987	544	1,017	1,273	526	1,583	1902.....	35,567	15,138	11,135	784	3,574	875	555	823	442	2,241
1892.....	16,297	1,255	7,544	790	2,312	407	891	1,084	465	1,549	1903.....	35,019	15,371	10,600	675	3,685	853	540	645	485	2,165
1893.....	11,588	1,500	4,668	439	1,742	373	534	698	356	1,278	1904.....	27,644	12,729	7,090	483	3,700	501	842	397	500	1,402
1894.....	11,880	2,968	4,419	348	1,493	233	243	532	277	1,307	1905.....	42,526	21,735	10,886	859	3,783	735	1,140	809	526	2,053
1895.....	15,958	3,866	5,812	649	2,199	520	307	900	282	1,423	1906.....	47,750	25,364	11,823	848	3,995	871	1,042	949	543	2,315
1896.....	16,005	4,284	5,707	607	2,042	535	385	748	265	1,432	1907.....	51,721	28,970	11,830	839	4,039	814	1,375	837	550	2,467
1897.....	17,518	5,601	6,087	554	2,069	604	336	724	254	1,259	1908.....	35,983	18,652	8,839	734	3,734	635	697	443	395	1,854
1898.....	19,434	5,964	7,347	510	2,402	593	180	773	275	1,390	1909.....	51,947	29,128	11,993	975	4,687	649	1,239	696	537	2,073

DIAGRAM 2.—PRODUCTION OF IRON ORE, BY PRINCIPAL STATES: 1909, 1899, 1889, AND 1879.

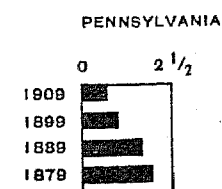
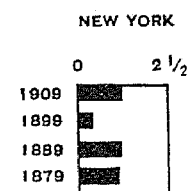
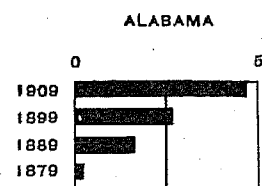
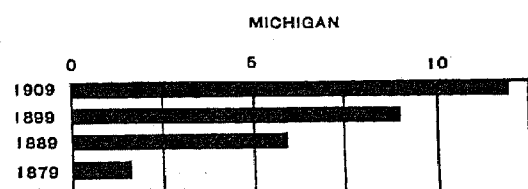
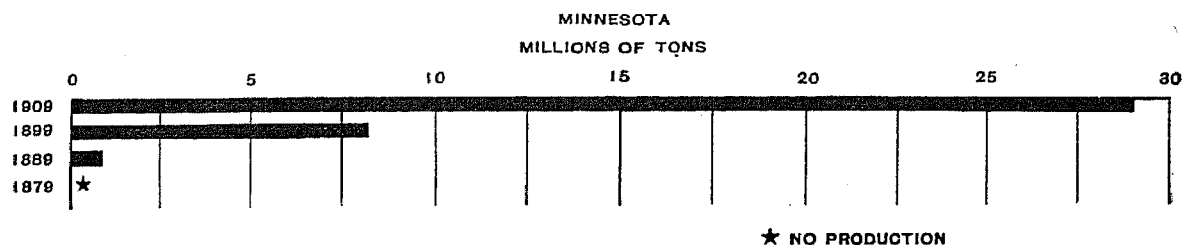
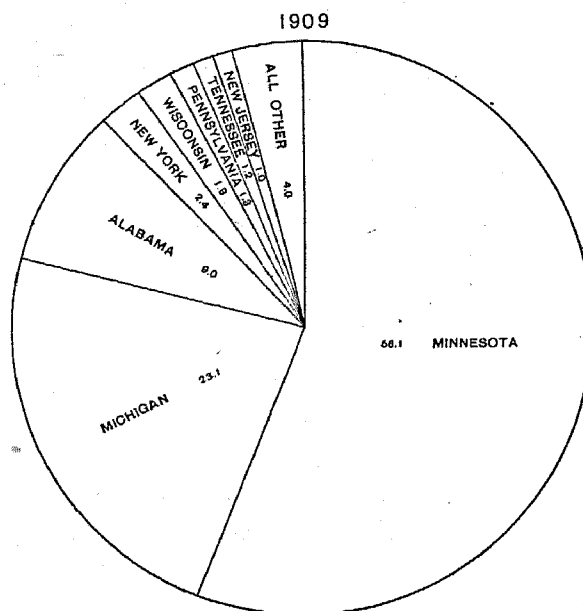


DIAGRAM 3.—PER CENT OF PRODUCTION OF IRON ORE, BY STATES: 1909.



Average expenses per ton, by states: 1879-1909.—Table 11 presents, for the United States and the principal iron-mining states, the average expenses for services and for supplies and materials per long ton of ore mined (gross):

STATE.	PRODUCING IRON MINES.							
	Average expense for salaries and wages per long ton of ore.				Average cost of supplies and materials per long ton of ore.			
	1909	1902	1889	1879	1909	1902	1889	1879
United States.....	\$0.64	\$0.66	\$0.99	\$1.51	\$0.33	\$0.25	\$0.34	\$0.46
Alabama.....	0.64	0.62	0.66	0.75	0.23	0.17	0.08	0.11
Michigan.....	0.98	0.89	1.08	1.57	0.41	0.33	0.41	0.57
Minnesota.....	0.43	0.38	1.13	.....	0.29	0.18	0.48	.....
Missouri.....	1.26	1.09	1.07	1.21	0.29	0.39	0.17	0.30
New York.....	0.92	0.90	0.87	1.37	0.61	0.53	0.46	0.48
Pennsylvania.....	0.28	0.62	0.73	1.34	0.17	0.20	0.19	0.32
Tennessee.....	0.90	0.67	0.75	1.04	0.28	0.17	0.18	0.11
Virginia.....	1.07	1.09	1.12	1.23	0.39	0.21	0.25	0.25

¹ Includes West Virginia.

The average expense for salaries and wages per ton of ore mined shows a decrease from 1879 to 1902 in each of the principal iron-mining states (excluding Minnesota), and an increase between 1902 and 1909 for all states named except Pennsylvania and Virginia. The decrease in the average for the United States as a whole between 1902 and 1909, notwithstanding increases in most individual states, was due to changes in the relative importance of the states in the production of ore. The cost of supplies and materials per ton varied considerably from census to census. From 1902 to 1909, however, all the states named except Missouri and Pennsylvania show a marked increase. As previously stated, the increased expense per ton for supplies and materials is directly related to the increased use of mechanical power.

The fact that there was between 1902 and 1909 an increase in the average expense per ton for salaries and wages in most states, despite the increased use of mechanical power, suggests that the saving in the amount of labor resulting from the increased use of machinery must have been attended by an increase in the rates of compensation. It is possible, however, that the increase in this average, as well as in the

average cost of supplies and materials per ton, was due partly to an unusually large amount of development work done by the producing mines in 1909.

The state of Pennsylvania presents peculiar conditions. The unusually low expense per ton for salaries and wages, as well as for supplies and materials, shown by the census of 1909, was due to the predominance of open-pit mining in that state, as will be brought out later in this report.

Comparative summary for producing mines, by districts and states: 1909 and 1902.—Table 12 gives, by states, more detailed comparative data for 1909 and 1902 than have been presented in preceding tables.

The item of "all other" expenses shows a greater relative increase between 1902 and 1909 than any other except that of payments for contract work. In reality, the increase in this class of expenses was still greater than is shown in Table 12, because of the fact that the figures for 1902 include interest on bonds amounting to the sum of \$521,111, as well as interest on other forms of indebtedness, the amount of which was not specified, while in 1909 interest was not included among the expenses reported. If the interest on bonds be deducted from the figures shown for 1902, the increase in this item from 1902 to 1909 becomes 374.3 per cent. The principal item among these expenses in 1909 was taxes, amounting to \$3,970,355. These consisted largely of payments on holdings of land, only a portion of which were under actual operation. (See also pages 244 and 245.)

The total reported expenses show an increase of 79.4 per cent between 1902 and 1909, while the quantity of ore mined increased only 46.1 per cent. The value of ore mined increased 67.9 per cent during the same period. The value of ore mined, however, for 1909 was estimated from the average value at the mine of the ore sold and used.

Notwithstanding the introduction of labor-saving devices, as indicated by the great increase in horsepower, the cost of mining apparently increased considerably. As already stated, this may perhaps be accounted for by unusually large expenditures for development work in 1909.

MINES AND QUARRIES.

COMPARATIVE STATISTICS FOR PRODUCING IRON MINES IN THE UNITED STATES, BY DISTRICTS AND STATES:
1909 AND 1902.

DISTRICT AND STATE.	Cen- sus year.	Num- ber of mines.	EXPENSES OF OPERATION AND DEVELOPMENT.						PRODUCTS.		Primary horse- power owned.
			Total.	Salaries and wages.	Supplies and mate- rials.	Royalties and rent of mines.	Contract work.	All other. ¹	Ore mined (long tons).	Value. ²	
United States ³	1909	483	\$74,071,830	\$33,121,418	\$17,229,717	\$15,174,735	\$2,698,842	\$5,847,118	51,947,129	\$109,881,000	342,069
Per cent of increase ⁴	1902	524	\$41,294,525	\$23,641,599	\$8,973,168	\$6,503,908	\$422,044	\$1,753,806	35,567,410	\$65,460,985	103,974
		-7.8	79.4	40.1	92.0	133.3	539.5	233.4	46.1	67.9	229.6
LAKE SUPERIOR DISTRICT.....	1909	195	\$61,552,979	\$25,236,687	\$13,901,022	\$14,784,131	\$2,613,823	\$5,017,316	42,095,627	\$94,104,000	262,305
Per cent of increase.....	1902	155	\$31,160,230	\$16,639,527	\$6,736,268	\$6,084,857	\$398,376	\$1,301,202	27,050,861	\$52,485,951	68,873
		25.8	97.5	51.7	106.4	143.0	556.1	285.6	55.6	79.3	280.9
Michigan.....	1909	83	\$22,459,011	\$11,764,957	\$4,909,979	\$3,827,652	\$430,148	\$1,520,075	11,992,693	\$32,380,000	108,262
Per cent of increase.....	1902	80	\$16,631,637	\$9,908,677	\$3,661,194	\$2,254,864	\$57,382	\$749,520	11,135,215	\$26,695,860	39,101
		3.8	35.0	18.7	34.1	69.8	660.1	102.8	7.7	21.3	176.9
Minnesota.....	1909	101	\$37,295,373	\$12,530,232	\$8,548,861	\$10,686,407	\$2,157,075	\$3,372,798	29,127,918	\$58,838,000	145,068
Per cent of increase.....	1902	59	\$12,979,812	\$5,807,927	\$2,699,115	\$3,648,750	\$338,244	\$485,776	15,137,650	\$23,989,227	23,838
		71.2	187.3	115.7	216.7	192.9	537.7	594.3	92.4	145.3	506.0
Wisconsin.....	1909	11	\$1,798,595	\$941,498	\$442,182	\$269,872	\$20,600	\$124,443	975,016	\$2,886,000	8,975
Per cent of increase ⁵	1902	16	\$1,648,781	\$922,923	\$375,959	\$181,243	\$2,750	\$65,906	783,996	\$1,800,864	5,834
		-31.2	16.1	2.0	17.6	48.9	649.1	88.8	24.4	60.3	53.8
SOUTHERN DISTRICT.....	1909	116	\$5,762,991	\$3,797,740	\$1,356,956	\$136,723	\$5,700	\$465,872	5,556,828	\$6,540,000	40,915
Per cent of increase ⁶	1902	100	\$4,152,726	\$3,073,984	\$801,758	\$139,961	\$500	\$136,623	4,779,570	\$5,613,056	11,731
		16.0	38.8	23.5	69.2	-2.3	1,040.0	241.2	16.3	18.6	248.8
Alabama.....	1909	52	\$4,624,284	\$3,022,435	\$1,100,591	\$90,190	\$5,700	\$405,368	4,687,468	\$5,391,000	31,838
Per cent of increase ⁶	1902	59	\$2,969,042	\$2,218,248	\$592,286	\$37,938	\$500	\$50,070	3,574,474	\$3,936,812	7,440
		-11.9	59.5	36.3	85.8	137.7	1,040.0	709.6	31.1	36.9	327.9
Georgia.....	1909	18	\$304,529	\$191,428	\$75,190	\$18,468	.....	\$19,443	219,976	\$331,000	3,496
Per cent of increase ⁶	1902	19	\$413,053	\$271,499	\$84,932	\$3,351	.....	\$68,271	330,554	\$452,717	2,521
		-5.2	-26.3	-29.5	15.8	121.1	.....	-71.5	-33.5	-26.9	38.7
Tennessee.....	1909	46	\$834,178	\$583,877	\$181,175	\$28,065	.....	\$41,051	649,394	\$818,000	5,581
Per cent of increase ⁶	1902	22	\$340,631	\$584,237	\$144,540	\$93,672	.....	\$18,182	874,542	\$1,123,527	1,770
		109.1	-0.8	-0.1	25.3	-70.0	.....	125.8	-25.7	-27.2	215.3
OTHER STATES.....	1909	172	\$6,755,860	\$4,086,991	\$1,971,739	\$253,881	\$79,319	\$363,930	4,294,664	\$9,237,000	38,849
Per cent of increase ⁶	1902	269	\$5,981,569	\$3,928,088	\$1,435,142	\$279,090	\$23,168	\$316,081	3,730,979	\$7,461,978	23,370
		-36.1	12.9	4.0	37.4	-9.0	242.4	15.1	15.1	23.8	66.2
Maryland.....	1909	13	\$41,106	\$28,319	\$8,503	\$1,343	\$395	\$2,546	22,704	\$44,500	391
Per cent of increase ⁶	1902	29	\$39,212	\$24,259	\$2,639	\$2,271	.....	\$10,043	24,367	\$46,911	315
		-55.2	4.8	16.7	222.2	-40.9	.....	-74.6	-6.8	-5.1	24.1
Missouri.....	1909	33	\$150,836	\$109,904	\$25,191	\$12,033	\$1,099	\$2,609	87,079	\$204,000	403
Per cent of increase ⁶	1902	34	\$102,166	\$72,241	\$26,052	\$2,538	\$500	\$835	66,308	\$106,379	535
		-2.9	47.6	62.1	-3.3	374.1	119.8	212.4	31.3	91.8	-24.7
New Jersey.....	1909	10	\$1,321,915	\$907,016	\$368,075	\$7,091	.....	\$39,733	536,958	\$1,584,000	6,585
Per cent of increase ⁶	1902	15	\$1,345,271	\$875,156	\$429,231	\$7,915	\$10,770	\$22,199	441,879	\$1,223,664	6,584
		-33.3	-1.7	3.6	-14.2	-10.4	.....	79.0	21.5	28.9	(⁶)
New York.....	1909	19	\$2,118,267	\$1,140,235	\$756,814	\$62,668	\$20,632	\$137,918	1,238,720	\$3,741,000	18,220
Per cent of increase ⁶	1902	15	\$990,807	\$497,270	\$293,850	\$12,385	.....	\$187,202	555,321	\$1,362,987	5,930
		26.7	113.8	129.3	157.5	406.0	.....	-26.3	123.1	174.5	207.3
Ohio.....	1909	4	\$22,701	\$12,830	\$3,225	\$176	\$5,254	\$1,216	13,468	\$24,500	.....
Per cent of increase ⁶	1902	12	\$42,839	\$40,938	\$345	\$1,503	.....	\$53	22,657	\$41,976	50
		-66.7	-47.0	-68.7	834.8	-88.3	.....	2,194.3	-40.6	-41.6	-100.0
Pennsylvania.....	1909	19	\$377,583	\$189,282	\$110,800	\$3,084	\$50,994	\$23,423	665,642	\$792,000	3,971
Per cent of increase ⁶	1902	47	\$740,021	\$510,995	\$166,422	\$26,343	\$1,228	\$35,033	822,932	\$1,225,453	3,760
		-59.6	-49.0	-63.0	-33.4	-88.3	4,062.6	-33.1	-19.1	-35.4	5.6
Virginia.....	1909	58	\$1,511,243	\$900,756	\$325,242	\$148,130	\$945	\$136,170	841,709	\$1,692,000	6,458
Per cent of increase ⁶	1902	62	\$1,391,711	\$1,062,992	\$201,426	\$93,429	\$6,730	\$27,134	973,301	\$1,652,799	4,378
		-6.5	8.6	-15.3	61.5	53.5	-86.0	401.8	-13.5	2.4	47.5
All other ⁷	1909	16	\$1,212,209	\$798,649	\$373,889	\$19,356	.....	\$20,315	888,384	\$1,155,000	2,821
Per cent of increase ⁶	1902	55	\$1,329,542	\$844,237	\$315,077	\$132,706	\$3,940	\$33,582	824,214	\$1,796,809	1,818
		-70.9	-8.8	-5.4	18.7	-85.4	.....	-39.5	7.8	-35.7	55.2

¹ Includes interest for 1902, of which \$521,111 was interest paid on bonds.² The value of ore mined for 1909 has been estimated from the average value per ton at the mine of ore used and sold.³ Exclusive of governmental institutions.⁴ Of this ore, 882,548 tons were concentrated at the mines, from which 653,339 tons of concentrate were derived.⁵ A minus sign (-) denotes decrease.⁶ Less than one-tenth of 1 per cent.⁷ Embraces Colorado, Connecticut, Kentucky, Massachusetts, Nevada, New Mexico, North Carolina, Texas, Utah, West Virginia, and Wyoming in 1909, and Colorado, Connecticut, Kentucky, Massachusetts, Montana, New Mexico, North Carolina, Texas, Utah, Vermont, West Virginia, and Wyoming in 1902.

In Table 13 the items of expense shown in Table 12 are reduced to averages per ton of iron ore mined.

Table 13

DISTRICT AND STATE.	Census year.	Average expense per ton mined.						Average value per ton of ore at mine. ¹
		Total.	Salaries and wages.	Supplies and materials.	Royalties and rent of mines.	Contract work.	All other.	
United States.....	1909	\$1.43	\$0.64	\$0.33	\$0.29	\$0.05	\$0.11	\$2.12
Increase ²	1902	1.16	0.66	0.25	0.18	0.01	0.05	1.84
		0.27	-0.02	0.08	0.11	0.04	0.06	0.28
LAKE SUPERIOR DIST.	1909	1.46	0.60	0.33	0.35	0.06	0.12	2.24
Increase ²	1902	1.15	0.61	0.25	0.22	0.01	0.05	1.94
		0.31	-0.01	0.08	0.13	0.05	0.07	0.30
Michigan.....	1909	1.87	0.98	0.41	0.32	0.04	0.13	2.70
Increase.....	1902	1.49	0.89	0.33	0.20	0.01	0.07	2.40
		0.38	0.09	0.08	0.12	0.03	0.06	0.30
Minnesota.....	1909	1.28	0.43	0.29	0.37	0.07	0.12	2.02
Increase.....	1902	0.86	0.38	0.18	0.24	0.02	0.03	1.58
		0.42	0.05	0.11	0.13	0.05	0.09	0.44
Wisconsin.....	1909	1.84	0.97	0.45	0.28	0.02	0.13	2.96
Increase ²	1902	1.98	1.18	0.48	0.23	(?)	0.08	2.30
		-0.14	-0.21	-0.03	0.05	0.02	0.05	0.66
SOUTHERN DISTRICT	1909	1.04	0.68	0.24	0.02	(?)	0.08	1.17
Increase ²	1902	0.87	0.64	0.17	0.03	(?)	0.03	1.15
		0.17	0.04	0.07	-0.01	-	0.05	0.02
Alabama.....	1909	0.99	0.65	0.23	0.02	(?)	0.09	1.15
Increase.....	1902	0.81	0.62	0.17	0.01	(?)	0.01	1.10
		0.18	0.03	0.06	0.01	-	0.08	0.05
Georgia.....	1909	1.38	0.87	0.34	0.08	-	0.08	1.51
Increase ²	1902	1.25	0.82	0.20	0.03	-	0.21	1.37
		0.13	0.05	0.14	0.05	-	-0.13	0.14
Tennessee.....	1909	1.28	0.90	0.28	0.04	-	0.06	1.26
Increase ²	1902	0.96	0.67	0.17	0.11	-	0.02	1.28
		0.32	0.23	0.11	-0.07	-	0.04	-0.02
OTHER STATES ⁴	1909	1.57	0.95	0.46	0.06	0.02	0.08	2.11
Increase ²	1902	1.60	1.05	0.38	0.07	0.01	0.08	2.00
		-0.03	-0.10	0.08	-0.01	0.01	-	0.11
Maryland.....	1909	1.81	1.25	0.37	0.06	0.02	0.11	1.96
Increase ²	1902	1.61	1.00	0.11	0.09	-	0.41	1.83
		0.20	0.25	0.26	-0.03	0.02	-0.30	0.03
Missouri.....	1909	1.73	1.26	0.29	0.14	0.01	0.03	2.34
Increase ²	1902	1.54	1.09	0.39	0.04	0.01	0.01	1.60
		0.19	0.17	-0.10	0.10	-	0.02	0.74
New Jersey.....	1909	2.46	1.69	0.69	0.01	-	0.07	2.95
Increase ²	1902	3.04	1.98	0.97	0.02	0.02	0.05	2.78
		-0.58	-0.29	-0.28	-0.01	-0.02	0.02	0.17
New York.....	1909	1.71	0.92	0.61	0.05	0.02	0.11	3.02
Increase ²	1902	1.78	0.90	0.53	0.02	-	0.34	2.45
		-0.07	0.02	0.08	0.03	0.02	-0.23	0.57
Ohio.....	1909	1.69	0.95	0.24	0.01	0.39	0.09	1.81
Increase ²	1902	1.89	1.81	0.02	0.07	-	(?)	1.85
		-0.20	-0.86	0.22	-0.06	0.39	0.09	-0.04
Pennsylvania.....	1909	0.57	0.28	0.17	(?)	0.08	0.04	1.19
Increase ²	1902	0.90	0.62	0.20	0.03	(?)	0.04	1.49
		-0.33	-0.34	-0.03	-0.03	0.08	-	-0.30
Virginia.....	1909	1.80	1.07	0.39	0.18	(?)	0.16	2.01
Increase ²	1902	1.43	1.09	0.21	0.10	0.01	0.03	1.70
		0.37	-0.02	0.18	0.08	-0.01	0.13	0.31

¹ The 1909 averages are based on the quantity of ore used and sold (see Table 50) while the 1902 averages are obtained from the quantity of ore mined as shown by Table 12. The two sets of averages are, however, sufficiently comparable for all practical purposes.

² A minus sign (-) denotes decrease.

³ Less than 1 cent.

⁴ Embraces, in addition to the states shown separately below, Colorado, Connecticut, Kentucky, Massachusetts, Nevada, New Mexico, North Carolina, Texas, Utah, West Virginia, and Wyoming in 1909, and Colorado, Connecticut, Kentucky, Massachusetts, Montana, New Mexico, North Carolina, Texas, Utah, Vermont, West Virginia, and Wyoming in 1902.

Attention has already been called in connection with Table 11 to the changes which took place between 1902 and 1909 in the average expenses per ton for salaries and wages and for supplies and materials. The present table shows that in the United States as a whole the total reported expense increased from \$1.16 per ton in 1902 to \$1.43 per ton in 1909, not-

withstanding the fact that the expenses for 1902 included interest, which was excluded in 1909. Increases appear in all of the items except the average expense for salaries and wages, which decreased in the United States as a whole, although increasing in most of the individual states. The average expenditure per ton for royalties and rent of mines (based on total tonnage, including that not produced under royalty) increased from \$0.18 to \$0.29, that for contract work from \$0.01 to \$0.05, and that for other miscellaneous objects from \$0.05 to \$0.11. Decreases are shown in one or more items for most of the states, the most important decreases, among the states with any considerable production, being in Wisconsin, New Jersey, and Pennsylvania, although in each of these states there was an increase in the average for one or more classes of expenses.

In the United States as a whole the average value of ore per ton at the mine increased from \$1.84 in 1902 to \$2.12 in 1909, or \$0.28 per ton—an increase slightly greater in absolute amount than that in the total reported expense per ton (\$0.27). There were considerable differences, however, among the individual states with respect to the relation between the increase in expenses and the increase in the value of ore at the mine. Pennsylvania and Tennessee were the only important producing states in which the average value of ore at the mine was less in 1909 than in 1902, and in Tennessee the decrease was only \$0.02 per ton.

As already stated, the increase in the average cost of production per ton between 1902 and 1909 may possibly be attributable in part to large expenditures for development work in the later year. This inference is suggested by the extraordinary increase in the average expenditure for contract work, while the average for salaries and wages decreased.

Comparative summary for nonproducing mines: 1909 and 1902.—Table 14 presents comparative statistics for 1909 and 1902 for those nonproducing mines for which separate reports were secured. It must be borne in mind that development work was pursued also by operators of producing mines, that some operators made combined reports covering at the same time producing and nonproducing mines, and that such combined reports were necessarily tabulated with those relating exclusively to producing mines.

Table 14

	NONPRODUCING IRON MINES.					
	United States.		Minnesota.		All other states. ¹	
	1909	1902	1909	1902	1909	1902
Number of mines.....	21	37	9	19	12	18
Number of salaried employees.....	46	28	31	6	15	22
Expenses of development work.....	\$862,301	\$805,559	\$630,425	\$300,460	\$231,876	\$245,099
Salaries and wages.....	350,560	177,317	274,204	75,936	76,356	101,381
Supplies and materials.....	321,556	143,541	223,217	60,310	93,339	77,231
Contract work.....	63,775	216,168	34,900	215,868	28,875	300
All other.....	126,410	68,533	98,104	2,346	28,306	66,187
Average expenses per mine.....	41,062	16,366	70,047	18,972	19,323	13,617

¹ Embraces Iowa, Michigan, Missouri, Pennsylvania, Tennessee, Utah, Virginia, and Wisconsin in 1909, and Alabama, California, Colorado, Iowa, Michigan, New Jersey, New York, Pennsylvania, and Utah in 1902.

The preceding table shows a marked increase in the scale of operations, particularly in Minnesota, where during the seven-year period the average expenses per mine increased nearly 300 per cent.

LAND TENURE, ROYALTIES, AND TAXES.

Land tenure—Summary for the United States.—Table 15 presents for 1909 statistics of land acreage and tenure for all mines, for producing mines, and for nonproducing mines, in the United States as a whole. The table distinguishes mineral land (that is, land definitely known to contain ore) from "Other land," but there is no doubt that much of the latter was acquired by operators in the belief that it would prove to contain ore.

	ACREAGE CONTROLLED: 1909		
	All mines.	Producing mines.	Nonproducing mines.
Total	1,343,634	1,313,214	30,420
Owned.....	1,087,865	1,064,227	23,638
Leased.....	255,769	248,987	6,782
Mineral land:			
Total.....	416,016	387,608	28,408
Owned.....	306,257	282,661	23,596
Leased.....	109,759	104,947	4,812
Other land:			
Total.....	927,618	925,606	2,012
Owned.....	781,608	781,566	42
Leased.....	146,010	144,040	1,970

¹ Thirteen operators failed to report acreage.

The table shows that 97.7 per cent of the total acreage controlled by operators of iron mines was connected with producing mines. Less than one-third of the total area held represented known mineral land. Of the land of both classes combined, more than four-fifths was owned by the mine operators, the rest being held under lease.

Land tenure, by states.—Table 16 gives statistics of land tenure, for producing and nonproducing mines combined, for each state reporting 1,000 or more acres of mineral land as held by iron-mine operators.

There is no apparent connection between the amount of land of all kinds, or the amount of mineral land, held by mine operators in a given state and the production of iron ore in the state. Thus, in 1909, the amount of mineral land held by operators of iron mines in New York was greater than in any other state, although the production of iron ore in New York was equal to but a small fraction of the production in Minnesota or Michigan.

There are wide differences among the states with respect to the relative importance of owned land and leased land. Thus, of all the land controlled by mine operators in Minnesota more than one-third was held under lease, while in Michigan less than one-tenth was held under lease, and in Georgia, Missouri, New York, and Ohio a very much smaller proportion still. In several states the proportion of the known mineral land held under lease is very different from the proportion of the land of all classes combined held under lease. In Michigan, Minnesota, New Jersey, and Virginia the acreage of mineral land held under lease was much greater than the acreage owned; but in the other states named in the table, except North Carolina, for which no owned land was reported, the owned mineral land greatly exceeded the leased.

ACREAGE CONTROLLED BY PRODUCING AND NONPRODUCING MINES, CLASSIFIED BY FORM OF TENURE AND CHARACTER OF LAND, BY STATES: 1909.¹

STATE.												
	All land.			Mineral land.			Timber land.			Other land.		
	Total.	Owned.	Leased.	Total.	Owned.	Leased.	Total.	Owned.	Leased.	Total.	Owned.	Leased.
United States	1,343,634	1,087,865	255,769	416,016	306,257	109,759	456,682	376,409	80,273	470,938	405,199	65,737
Alabama.....	63,226	53,419	9,807	52,000	42,337	9,663	4,746	4,746	.....	6,480	6,336	144
Georgia.....	73,683	72,273	1,410	70,570	69,160	1,410	.....	.....	.....	3,113	3,113	.....
Kentucky.....	9,600	5,600	4,000	6,600	5,600	1,000	3,000	.....	3,000	.....	.....	.....
Michigan.....	249,542	225,205	24,337	19,091	6,250	12,841	162,248	154,384	7,864	68,203	64,571	3,632
Minnesota.....	333,822	201,586	132,236	15,805	2,710	13,095	86,302	22,970	63,332	231,715	175,906	55,809
Missouri.....	115,968	111,425	4,543	36,721	32,335	4,386	957	880	77	78,290	78,210	80
New Jersey.....	13,668	5,169	8,499	12,968	4,469	8,499	660	660	.....	40	40	.....
New York.....	247,783	239,564	8,219	95,920	87,701	8,219	131,633	131,633	.....	20,230	20,230	.....
North Carolina.....	4,000	.....	4,000	1,000	.....	1,000	.....	.....	.....	3,000	.....	3,000
Ohio.....	4,390	4,310	80	4,390	4,310	80	.....	.....	.....	.....	.....	.....
Pennsylvania.....	18,234	13,376	4,858	12,165	7,307	4,858	6,065	6,065	.....	4	4	.....
Tennessee.....	77,156	65,007	12,149	14,390	10,091	4,299	21,230	15,250	6,000	41,606	39,758	1,850
Virginia.....	96,445	58,453	37,992	64,272	26,450	37,822	22,953	22,953	.....	9,220	9,050	170
Wisconsin.....	20,474	17,623	2,851	8,163	6,364	1,799	4,163	4,163	.....	8,142	7,096	1,052
All other states ²	15,643	14,855	788	2,051	1,263	788	12,705	12,705	.....	887	887	.....

¹ Thirteen operators failed to report acreage.

² Includes a possible duplication of 753 acres which were sublet by operators of mines to other persons who may have been operators.

³ Embraces states reporting less than 1,000 acres of mineral land, as follows: Colorado, Connecticut, Iowa, Maryland, Massachusetts, Nevada, New Mexico, Texas, Utah, West Virginia, and Wyoming.

Concentration of control.—Table 17 classifies the operators who reported the amount of land controlled according to the number of acres held by each. The

classification is based on the land of all kinds combined, and the table covers both producing and non-producing mines.

Table 17

ACRES PER OPERATOR.	PRODUCING AND NONPRODUCING IRON MINES: 1909		
	Number of operators.	Land controlled.	
		Amount (acres).	Per cent of total.
Total.....	178	1,343,634	100.0
Less than 100.....	49	2,276	0.2
100 but less than 1,000.....	76	25,665	1.9
1,000 but less than 10,000.....	47	166,129	12.4
10,000 but less than 50,000.....	11	315,062	23.4
50,000 and over.....	4	834,502	62.1

¹ Thirteen operators failed to report acreage.

As appears in the table, 4 operators, each with more than 50,000 acres, controlled over three-fifths of all land connected with iron mines, and 11 other operators, holding more than 10,000 acres each, controlled nearly one-fourth of the total acreage. The very large holders, however, usually have a great deal of land not yet proved to contain iron ore. Moreover, of the known mineral land controlled by such operators, a great deal is held in reserve. The small holders, on the other hand, are in general mining out their ore at a relatively rapid rate. These conditions are indicated by Table 18, in which the operators of producing mines are classified according to acreage controlled, and the value of the ore and by-products produced in 1909 by operators of each group is shown in comparison with the acreage controlled. As a means of convenient comparison, averages have been computed for the respective groups by dividing the value of ore produced by the acreage of all land held, but in considering these averages it should not be forgotten that much of the land is not known to contain ore.

Table 18

ACRES PER OPERATOR.	PRODUCING IRON MINES: 1909					
	Number of operators.	Acreage of all land controlled.		Value of iron ore and by-products.		
		Amount.	Per cent of total.	Amount.	Per cent of total.	Average per acre of land controlled.
Total.....	163	1,313,214	100.0	\$105,635,628	100.0	\$80
Less than 100.....	36	1,854	0.2	2,215,719	2.1	1,195
100 but less than 1,000.....	68	23,613	1.8	8,433,756	8.0	357
1,000 but less than 10,000.....	45	159,183	12.1	41,605,987	39.4	261
10,000 but less than 50,000.....	10	294,062	22.4	3,405,856	3.2	12
50,000 and over.....	4	834,502	63.5	49,974,310	47.3	60

¹ Thirteen operators with an aggregate value of products amounting to \$1,311,454 failed to report acreage.

The average value of the iron-ore production per acre of land for the several groups of operators was in the main in inverse ratio to the acreage controlled per operator. The operators who controlled less than 100 acres each on the average produced ore valued at nearly \$1,200 per acre of land (of all classes) controlled, as compared with \$60 per acre for operators holding 50,000 acres or over, and only \$12 per acre for operators controlling 10,000 to 50,000 acres.

Royalties.—Mining on leased land has increased in importance, both absolutely and relatively, since 1879.

In that year the total amount paid in royalties was \$1,020,429, as compared with \$6,503,908 in 1902 and \$15,174,735 in 1909. The amount of royalties paid in 1889 is not available. Table 19 presents comparative statistics of tonnage on which royalties were paid in 1909 and 1879.

Table 19

	1909	1879
Ore mined upon which royalties were paid (long tons).....	35,543,717	2,084,396
Per cent of tonnage mined in the United States.....	68.4	33.0
Royalties.....	\$14,880,282	\$1,020,429
Average per ton mined.....	\$0.42	\$0.49

¹ The variation between this figure and that for the total royalties shown in other tables is due to the absence of data for the quantities of ore upon which royalties were paid by some operators who mined ore both from owned and from leased land. The amount of royalties paid upon ore of this sort was less than 2 per cent of the total, and may, therefore, be disregarded.

In 1909 royalties were paid on more than two-thirds of all ore mined, but in 1879 on less than one-third. The average royalty per ton decreased during the 30 years, from \$0.49 to \$0.42.

Practically all of the ore (96.9 per cent) upon which royalties were paid in 1909 was mined in the Lake Superior district. The amount reported as produced under royalty in that district was 34,447,782 tons, being 81.8 per cent of the total output of the district. The royalties paid on this ore were \$14,637,203, in addition to which a small amount was paid in royalties on ore the tonnage of which was not reported separately. The average royalty per ton in the Lake Superior district was the same as in the United States taken as a whole.

Taxes.—Taxes constitute an important item in the total expense of iron mines. In recent years the extensive lands held by the operators of iron mines, particularly in the Lake Superior district, have been taxed at much higher rates than formerly.

Table 20

Table 20									
PRODUCING MINES WHICH REPORTED BOTH THE AMOUNT OF TAXES PAID AND THE ACREAGE OF LAND CONTROLLED: 1909									
STATE.	Taxes paid.		Acreage controlled. ¹						
	Amount.	Average per ton of ore mined.	All classes of land.			Mineral land.			
			Total.	Owned.	Leased.	Total.	Owned.	Leased.	
United States.....	\$3,963,251	\$0.08	1,176,100	937,133	238,967	352,574	257,587	95,007	
Alabama.....	30,092	0.01	53,216	48,816	4,406	41,990	37,728	4,262	
Georgia.....	3,005	0.01	69,957	69,767	190	66,844	66,654	190	
Maryland.....	582	0.03	10,570	10,490	80	170	90	80	
Missouri.....	810	0.01	2,430	2,147	283	1,263	1,057	206	
Michigan.....	961,401	0.08	247,656	223,419	24,237	17,205	4,464	12,741	
Minnesota.....	2,810,266	0.10	332,153	201,385	130,767	14,256	2,510	11,746	
New Jersey.....	7,350	0.01	13,640	5,141	8,499	12,940	4,441	8,499	
New York.....	51,491	0.04	247,783	239,564	8,219	95,920	87,701	8,219	
Ohio.....	389	0.03	4,310	4,230	80	4,310	4,230	80	
Pennsylvania.....	19,415	0.03	17,468	12,733	4,735	11,399	6,664	4,735	
Tennessee.....	6,863	0.01	49,756	49,607	9,749	12,750	9,001	3,749	
Utah.....	502	0.01	268	268		268	268		
Virginia.....	16,420	0.02	94,003	57,437	36,566	61,830	25,434	36,396	
Wisconsin.....	46,710	0.05	15,150	12,379	2,771	2,839	1,120	1,719	
All other ²	7,895	0.01	17,740	9,355	8,385	8,590	6,205	2,385	

¹ In addition to the acreage shown in the preceding table, 137,114 acres were held by operators who reported no taxes. It is probable that the taxes may have been included by them in the amounts reported for "Sundry expenses." Of those holdings, 127,694 acres represented land owned and 9,420 acres land leased. The holdings of mineral land aggregated 35,034 acres, the rest being timber and other land.

² In Alabama the sum of \$6,959, and in Virginia the sum of \$145, was reported by operators who failed to report acreage.

³ Embraces Connecticut, Kentucky, Massachusetts, Nevada, New Mexico, North Carolina, Texas, West Virginia, and Wyoming.

The taxes on lands held under lease are ordinarily paid by the operators and not by the owners. In the preceding table the taxes paid are shown in comparison with the acreage of land held. This table includes only producing mines for which both acreage of land controlled and taxes were reported.

The largest amount of taxes was paid in Minnesota and Michigan, the total for these two states (\$3,772,000) being 95.2 per cent of the total for the United States. The taxes in Minnesota were equal to \$0.10 per ton of ore mined during the year, or to nearly \$9 per acre

of the land held (by ownership or lease) by the operators, and in Michigan the taxes were equal to \$0.08 per ton mined, or to nearly \$4 per acre held, whereas in other states the average amount of taxes ranged from \$0.01 to \$0.05 per ton. For all states taken together, except Minnesota and Michigan, the taxes averaged only \$0.32 per acre controlled by the operators. It should be noted in this connection that in Minnesota less than 5 per cent of the total acreage owned or held under lease was reported as known mineral land, and in Michigan only about 7 per cent.

PERSONS ENGAGED IN THE INDUSTRY.

Salaried employees.—Table 21 shows the number of salaried employees classified according to grade for all mines in 1909 and their total salaries. The number of salaried employees, 2,916, constituted only 5.2 per cent of the total number of persons engaged in the industry.

CLASS.	SALARIED EMPLOYEES, ALL MINES: 1909	
	Number.	Salaries.
Total.....	2,916	\$3,423,992
Officers of corporations.....	134	425,914
Superintendents and managers.....	917	1,342,143
Clerks and other subordinate salaried employees.....	1,865	1,655,935

Wage earners, by age and occupation: 1909.—Table 22 shows the number of wage earners employed in producing mines on December 15, 1909, or the nearest representative day, according to age and occupation. The distinction between miners and miners' helpers is not always very definite, and in all other tables these two classes are therefore combined.

CLASS.	WAGE EARNERS IN PRODUCING IRON MINES: 1909	
	Number.	Per cent of total.
Total.....	52,230	100.0
Men 16 years of age and over:		
Engineers, firemen, machinists, carpenters, and other mechanics.....	7,073	13.5
Miners.....	21,708	41.6
Miners' helpers.....	3,218	6.2
All other.....	19,742	37.8
Boys under 16 years of age.....	499	0.9

The usual division of wage earners into skilled and unskilled is indicated only indirectly in the preceding classification. The group of engineers, firemen, machinists, carpenters, and other mechanics, comprising 13.5 per cent of all employees in 1909, belong to the skilled class. On the other hand, miners' helpers and other employees, aggregating 44.9 per cent of the total force, may be classed as unskilled. Between these two extremes are the miners, who in 1909 constituted 41.6 per cent of all wage earners. Probably some of these should be classed as skilled and some as unskilled.

Wage earners employed, by months.—Table 23 shows, for the United States as a whole, the number of wage earners reported as employed on the 15th day of each month in all mines and in producing mines and non-producing mines separately, together with percentages showing the ratio between the number reported for each month and the number reported for the month of maximum employment.

MONTH.	WAGE EARNERS EMPLOYED IN IRON MINES ON THE 15TH DAY OF EACH MONTH: 1909					
	Number. ¹			Per cent of maximum.		
	All mines.	Producing mines.	Non-producing mines.	All mines.	Producing mines.	Non-producing mines.
January.....	43,746	43,491	255	84.7	85.2	33.9
February.....	44,373	44,076	297	85.9	86.3	39.5
March.....	44,795	44,446	349	86.7	87.1	46.4
April.....	43,897	43,580	317	85.0	85.4	42.2
May.....	46,029	45,712	317	89.1	89.5	42.2
June.....	46,589	46,233	356	90.2	90.6	47.3
July.....	48,254	47,794	460	93.4	93.6	61.2
August.....	49,325	48,763	563	95.5	95.5	74.9
September.....	50,748	50,191	557	98.2	98.3	74.1
October.....	51,639	51,055	584	99.9	100.0	77.7
November.....	51,654	51,031	623	100.0	99.9	82.8
December.....	51,326	50,574	752	99.4	99.1	100.0

¹ The figures in boldface type represent the maximum number employed.

In the industry as a whole, November was the month of maximum employment in 1909, 51,654 wage earners being reported. The month of minimum employment was January, the 43,746 wage earners reported for that month constituting 84.7 per cent of the maximum.

It will be noted that the number of wage earners reported for all mines on a representative day, which is presented in various other tables, aggregated 52,983, or somewhat more than the number shown for November 15, which was the largest number reported for the 15th of any month. While for many mines the representative day selected for reporting wage earners in detail was December 15, there were numerous cases in which December was not a representative month and in which reports were made for some other date. It must be borne in mind that the month of maximum employment varied for the several states. The aggregate number reported by the mine operators for the representative day may be accepted as more nearly approximating the actual number of wage earners who derived a livelihood from iron mining in

1909 than the number reported for November. This conclusion is suggested by the statistics presented in Table 24, which relate to producing mines in those states where at least 500 wage earners were employed during the month of maximum employment.

Table 24 WAGE EARNERS IN PRODUCING IRON MINES: 1909					
STATE.	Maximum.		Minimum.		Per cent of maximum.
	Month.	Number.	Month.	Number.	
Alabama.....	November....	5,652	June.....	4,700	84.2
Georgia.....	December....	734	May.....	380	51.8
Michigan.....	December....	16,052	April.....	14,128	88.0
Minnesota.....	October.....	16,740	January....	12,679	75.7
New Jersey.....	October.....	2,130	May.....	1,749	82.1
New York.....	December....	2,510	May.....	1,792	71.4
Pennsylvania.....	December....	696	March.....	437	62.8
Tennessee.....	December....	1,523	April.....	1,136	74.6
Virginia.....	September..	3,019	January....	2,590	85.8
Wisconsin.....	November....	1,446	January....	1,939	71.9

The fluctuations of employment are largely dependent upon the character of operations, the method of working, and climatic conditions. Table 25 shows the monthly fluctuations of employment separately for open-pit and underground mines, so far as separate reports for each class were secured.

As can be seen from Table 25, in the Lake Superior district the range of fluctuation of employment in underground mines did not exceed 12 per cent, as compared with a fluctuation of 15.1 per cent in the Southern district. In open-pit mining, on the other hand, the force employed in August in the Lake Superior district was more than twice as large as that employed in January, February, or March, while in the Southern district the variation between the months of maximum and of minimum employment was only 18.8 per cent of the maximum.

Table 25 WAGE EARNERS EMPLOYED IN PRODUCING IRON MINES ON 15TH OF EACH MONTH: 1909												
MONTH.	Number. ¹						Per cent of maximum.					
	United States.		Lake Superior district.		Southern district.		United States.		Lake Superior district.		Southern district.	
	Open-pit mining only.	Underground mining only.	Open-pit mining only.	Underground mining only.	Open-pit mining only.	Underground mining only.	Open-pit mining only.	Underground mining only.	Open-pit mining only.	Underground mining only.	Open-pit mining only.	Underground mining only.
January.....	6,762	26,281	879	17,506	3,071	3,843	79.4	88.6	43.8	88.0	95.2	87.7
February.....	6,627	26,700	877	17,956	2,821	3,754	77.8	90.0	43.7	90.3	87.4	85.6
March.....	6,806	26,956	878	18,142	2,912	3,953	79.9	90.9	43.7	91.2	90.2	90.2
April.....	7,207	25,822	1,099	17,589	2,848	3,795	84.6	87.0	54.7	88.4	88.3	86.6
May.....	7,587	26,121	1,829	17,789	2,621	3,879	89.0	88.0	91.0	89.4	81.2	88.5
June.....	7,798	26,066	1,983	17,766	2,628	3,722	91.5	87.9	98.7	89.3	81.4	84.9
July.....	8,067	26,995	1,982	18,307	2,785	3,957	94.7	91.0	97.7	92.0	86.3	90.3
August.....	8,388	27,504	2,008	18,628	2,951	4,033	98.5	92.7	100.0	93.6	91.4	92.0
September.....	8,505	28,694	1,953	19,316	3,079	4,173	99.8	96.7	97.2	97.1	85.4	95.2
October.....	8,463	29,252	1,985	19,690	3,175	4,258	99.3	98.6	98.8	99.0	88.4	97.1
November.....	8,820	29,509	1,938	19,763	3,227	4,384	100.0	99.5	96.5	99.3	100.0	100.0
December.....	8,501	29,668	1,799	19,895	3,227	4,284	99.8	100.0	89.5	100.0	100.0	97.7

¹ The figures in boldface type represent the maximum number employed.

Days in operation.—The number of working days during the year varies considerably for different enterprises. Table 26 gives the distribution of producing enterprises according to the number of days in operation during 1909.

Table 26 DAYS IN OPERATION.			PRODUCING IRON-MINING ENTERPRISES: 1909	
	Number.	Per cent of total.		
Total.....	1,299	100.0		
30 or less.....	10	3.3		
31 to 60.....	4	1.3		
61 to 90.....	17	5.7		
91 to 120.....	15	5.0		
121 to 150.....	20	6.7		
151 to 180.....	18	6.0		
181 to 210.....	9	3.0		
211 to 240.....	17	5.7		
241 to 270.....	15	5.0		
271 to 300.....	64	21.4		
301 to 330.....	100	33.4		
331 to 365.....	10	3.3		

¹ Exclusive of 1 enterprise for which the number of days in operation was not reported.

The variation in the number of working days is largely dependent upon the method of working, as

appears from Table 27, which classifies according to the number of days in operation, so far as the information is available, open-pit and underground mines separately.

Table 27 DAYS IN OPERATION.		PRODUCING IRON-MINING ENTERPRISES: 1909	
		Open-pit mining exclusively.	Underground mining exclusively.
Total.....		1,137	138
270 days or less.....		85	31
Over 270 days.....		52	107

¹ Exclusive of 1 enterprise for which the number of days in operation was not reported.

Prevailing hours of labor.—Table 28 classifies all mines according to the prevailing hours of labor, and gives the number and percentage in each group. The wage earners of each mine are classed as a total, regardless of the fact that some may work more or fewer hours than those prevailing for the majority.

Table 28

PREVAILING HOURS PER DAY.	ALL IRON MINES: 1909			
	Mines with prevailing hours specified.		Wage earners in mines where the prevailing hours were as specified.	
	Number.	Per cent of total.	Number.	Per cent of total.
Total.....	1 494	100.0	52,983	100.0
8 hours.....	25	5.1	2,344	4.4
9 hours.....	32	6.5	2,132	4.0
10 hours.....	426	86.2	47,555	89.8
11 hours.....	9	1.8	805	1.5
12 hours.....	2	0.4	147	0.3

¹ Exclusive of 6 mines operated by contract work and 4 that employed no wage earners.

² Includes 7 mines which were run by 2 shifts of 8 and 10 hours, respectively.

³ Exclusive of 7 mines which were run by 2 shifts.

PRODUCTION AND CONSUMPTION OF ORE.

Summary for the United States: 1909.—The following statement shows in detail the quantity and value of the products of iron mines in 1909, and also the value of iron ore produced by concerns in other industries.

Production of iron mines:

Gross production, long tons.....	51,947,129
Production after concentration, long tons.....	51,717,920
Ore used or shipped for use in affiliated furnaces and sold—	
Quantity, long tons.....	50,521,208
Gross value.....	\$159,464,353
Deductions for haulage and freight.....	51,969,424
Deductions for commissions and storage.....	955,355
Net value at mines.....	106,539,574
Value of by-products.....	407,508
Total net value of ore used or shipped for use and sold, and of by-products.....	106,947,082
Value of iron ore produced in other industries.....	175,965
Total net value of iron ore.....	106,715,539

The gross production of iron ore in 1909 in iron mines was 51,947,129 tons. The amount of ore used or shipped for use in blast furnaces affiliated with the mines and of ore sold was somewhat less, 50,521,208 tons. Only to such ore was a value assigned in the returns. The value of much of this ore was reported on a basis which included cost of delivery. The gross value of the ore as reported, including delivery and other charges, was \$159,464,353, but the expenditures for haulage and freight and for commissions and storage amounted to \$52,924,779, so that the net value of the ore at the mines was \$106,539,574. In addition to iron ore, the mines produced various by-products, the most important of which was manganiferous ore, the total value of such by-products being \$407,508, so that the net value of iron ore used or shipped for use and sold and of by-products combined was \$106,947,082.¹ The value of iron ore produced in other industries (gold and silver

¹ It may be noted that some of the expenditure for haulage, freight, commissions, and storage applied to the by-products, particularly manganiferous ore, but, since the great bulk of it undoubtedly applied to the iron ore itself, it has been considered preferable to deduct the entire amount for haulage, freight, commissions, and storage from the gross value of iron ore in order to give a net value for this product.

The 10-hour working day (for all or most employees) is customary in a large majority of the iron mines of the United States, and was the rule, without exception, in the states of Iowa, Kentucky, New Mexico, New York, North Carolina, Ohio, Texas, West Virginia, Wisconsin, and Wyoming. The 11-hour day was reported for 2 mines in New Jersey, 6 in Tennessee, and 1 in Alabama; and a 12-hour day was reported for 2 mines in Georgia. On the other hand, the 8-hour day was reported for all mines in Utah, 5 mines in Alabama, 6 in Michigan, 3 in Minnesota, 2 in New Jersey, and 1 each in Pennsylvania, Virginia, and Nevada. A 9-hour day was reported by a considerable number of mines distributed quite generally among the states.

mining, limestone quarrying, and brick and tile manufacturing) in 1909 was reported as \$175,965, which, added to the net value of ore at the iron mines (\$106,539,574), gives a total value of iron ore for 1909 amounting to \$106,715,539.

Comparison with the report of the United States Geological Survey.—The statistics relating to the quantity and value of products were collected by the Bureau of the Census in cooperation with the United States Geological Survey. The schedule called for the quantity of ore mined, of ore sold, and of ore used by the mine operator in his own blast furnaces, and the stocks of iron ore on hand at the mine, at lake ports, or elsewhere, on January 1, and December 31, 1909. Many of the answers to these inquiries were found, on examination, to be inconsistent. The statistics of production in the present report, therefore, represent primarily ore shipments from the mines, comprising the ore sold in the market, as well as that used by blast furnaces affiliated with the mines. Wherever the quantity of ore actually mined is shown it represents the figures reported by the mine operators, these figures being less liable to error than would be those computed from the quantities reported as in stock at the mines at the beginning and at the end of the year and as used or sold.

The United States Geological Survey, on the other hand, has computed the annual production from the shipments and the stocks at lake ports and other transportation terminals. Furthermore, the statistics of the United States Geological Survey include a small amount of iron ore obtained as a by-product of other than iron mines, whereas the quantities of iron ore shown in the present report relate solely to the product of iron mines. The total quantity mined, after concentration of 882,548 tons in New York, as shown in the present report, was 51,717,920 long tons, whereas the total production shown in the report of the United States Geological Survey for 1909 was 51,294,271 tons, the former quantity being 423,649 tons, or slightly less than 1 per cent, in excess of the latter. All of this difference except 57,433 tons is

found in the figures for the state of Alabama. The total of the United States Geological Survey for that state represents virtually the shipments of ore plus the consumption by blast furnaces at the mines. The variation between this figure and the total shipments and consumption at the mines, as shown in this report, amounts to only 8,892 tons. The variation between the two reports for all other states is equal to only 0.1 per cent.

As already stated, however, the reports of the Geological Survey are intended primarily to represent shipments, and should therefore be compared with the statistics of the Census Bureau as to the amount of ore used or shipped for use by blast furnaces affiliated

with the iron mines or sold, rather than with those as to the quantity produced. The amount reported in the census returns as so used, shipped, and sold was 50,521,208 tons, as compared with the Geological Survey report of 51,294,271 tons, the difference being about 1.5 per cent. The difference is not sufficient to cast any doubt upon the approximate correctness of either set of figures.

Disposition of ore.—Table 29 shows, for the United States as a whole, for the two principal districts into which it is divided, and for individual states, the disposition of the ore which was produced by iron mines in 1909 and either used or shipped for use in affiliated blast furnaces or sold.

DISPOSITION OF ORE USED AND SOLD, BY DISTRICTS AND STATES: 1909.

Table 29	DISTRICT AND STATE.	IRON ORE USED AND SOLD (LONG TONS).								
		Total.	Used in blast furnaces affiliated with mines.			Sold.	Per cent of total.			
			Total.	At mine.	At a distance.		Used in affiliated blast furnaces.			Sold.
							Total.	At mine.	At a distance.	
United States.....	50,521,208	32,239,481	4,432,808	27,806,673	18,281,727	63.8	8.8	55.0	36.2	
LAKE SUPERIOR DISTRICT.....	41,242,374	25,467,822	103,574	25,364,248	15,774,552	61.8	0.3	61.5	38.2	
Michigan.....	11,924,995	4,224,631	31,265	4,193,366	7,700,364	35.4	0.3	35.1	64.6	
Minnesota.....	28,314,713	21,047,279	.....	21,047,279	7,267,434	74.3	.....	74.3	25.7
Wisconsin.....	1,002,666	195,912	72,309	123,603	806,754	19.5	7.2	12.3	80.5	
SOUTHERN DISTRICT.....	5,181,605	4,632,318	3,467,984	1,164,334	549,287	89.4	66.9	22.5	10.6	
Alabama.....	4,312,360	4,087,350	3,281,579	805,771	225,010	94.8	76.1	18.7	5.2	
Georgia.....	219,976	157,525	19,622	137,903	62,451	71.6	8.9	62.7	28.4	
Tennessee.....	649,269	387,443	166,783	220,660	261,826	59.7	25.7	34.0	40.3	
OTHER STATES.....	4,097,229	2,139,341	861,250	1,278,091	1,957,888	52.2	21.0	31.2	47.8	
Maryland.....	22,675	15,790	73	15,717	6,885	69.6	0.3	69.3	30.4	
Missouri.....	86,954	50,981	.....	50,981	35,973	58.6	.....	58.6	41.4
New Jersey.....	559,828	294,075	148,729	145,346	265,753	52.5	26.6	25.9	47.5	
New York.....	1,024,173	87,156	87,156	.....	937,017	8.5	8.5	.....	91.5
Ohio.....	13,468	5,839	5,839	.....	7,629	43.4	43.4	.....	56.6
Pennsylvania.....	664,813	146,520	23,789	122,731	518,293	22.0	3.6	18.4	78.0	
Utah.....	33,784	.....	.....	.....	33,784	.....	.....	.....	100.0
Virginia.....	837,625	785,673	546,223	239,450	51,852	93.8	65.2	28.6	6.2	
All other ¹	853,909	753,307	49,441	703,866	100,602	88.2	5.8	82.4	11.8	

¹ Embraces Colorado, Connecticut, Kentucky, Massachusetts, Nevada, New Mexico, North Carolina, Texas, West Virginia, and Wyoming.

Of the 50,521,208 tons of ore reported as used or sold, 32,239,481 tons, or 63.8 per cent, were used or shipped for use in blast furnaces affiliated with the mines and 18,281,727 tons, or 36.2 per cent, were sold. There was considerable variation among the districts and states with respect to the disposition of ore. In the Southern district nearly nine-tenths of the ore was used in or shipped to blast furnaces affiliated with the mines—being largely used in furnaces located immediately at the mines—while of the ore of the Lake Superior district the proportion so used or shipped was 61.8 per cent, practically none being used in blast furnaces located at the mines. There was, however, a conspicuous difference between the conditions in Minnesota, on the one hand, and in Michigan and Wisconsin, on the other. Most of the ore produced in New York was sold, but in the majority of the states the ore sold constituted less than half of the total in 1909.

Value of ore disposed of in different ways, with average values.—Table 30 shows, for the United

States as a whole, for the two principal producing districts, and for selected states, the quantity, value, and average value of ore disposed of in different ways. In the case of ore sold it distinguishes that sold on the basis of prices "f. o. b. mine" and that sold "f. o. b. market"—that is, on the basis of prices including cost of delivery. The table also shows the gross value, including that of by-products, of all ore used or shipped for use in affiliated furnaces or sold, the amount of deductions for haulage, freight, commissions, and storage, and the net value of all products at the mines.

The average values per ton in which delivery charges are included are, of course, not comparable with those based on mine prices. Moreover, in the case of average values in which delivery charges are included, comparisons between different districts have little significance on account of the differences in the distances which the ore is transported. The value of most of the ore shipped for use in blast furnaces affiliated with the

mines but located at a distance, was reported on the delivered basis, but comparisons between the average values per ton shown for such ore, and the average values per ton shown for ore sold f. o. b. market, are of doubtful significance because the value reported for

some of the ore shipped for use in affiliated furnaces represented the net value at the mine, and also because the ore shipped for use in affiliated blast furnaces may have been shipped a greater or less distance than that sold f. o. b. market.

DISPOSITION OF IRON ORE USED AND SOLD, WITH AVERAGE VALUES, BY DISTRICTS AND STATES: 1909.

Table 30	United States.	LAKE SUPERIOR DISTRICT.			SOUTHERN DISTRICT.			OTHER STATES.				
		Total.	Minne- sota.	Other states. ¹	Total.	Alabama.	Other states. ²	Total.	Pennsyl- vania.	Virginia.	All other. ³	
Ore used in blast furnaces affil- ated with the mines:												
Total—												
Long tons.....	32,239,481	25,467,822	21,047,279	4,420,543	4,632,318	4,087,350	544,968	2,139,341	146,520	785,673	1,207,148	
Value.....	\$102,804,183	\$91,974,470	\$75,466,935	\$16,507,505	\$5,516,743	\$4,767,062	\$749,681	\$5,312,970	\$230,720	\$1,574,100	\$3,508,150	
Average value per ton..	\$3.19	\$3.61	\$3.59	\$3.73	\$1.19	\$1.17	\$1.38	\$2.48	\$1.57	\$2.00	\$2.91	
At mine—												
Long tons.....	4,432,908	103,574	103,574	103,574	3,467,984	3,281,579	186,405	861,250	23,789	546,223	291,238	
Value.....	\$6,151,262	\$137,583	.....	\$137,583	\$4,019,523	\$3,755,975	\$263,548	\$1,994,156	\$64,171	\$1,031,213	\$898,772
Average value per ton ..	\$1.39	\$1.33	.....	\$1.33	\$1.16	\$1.14	\$1.41	\$2.32	\$2.70	\$1.89	\$3.09
At a distance—												
Long tons.....	27,806,673	25,364,248	21,047,279	4,316,969	1,164,334	805,771	358,563	1,278,091	122,731	239,450	915,910	
Value.....	\$96,652,921	\$91,836,887	\$75,466,935	\$16,369,922	\$1,497,220	\$1,011,087	\$486,133	\$3,318,814	\$166,549	\$542,887	\$2,609,378	
Average value per ton ..	\$3.48	\$3.62	\$3.59	\$3.79	\$1.29	\$1.25	\$1.36	\$2.60	\$1.36	\$2.27	\$2.85	
Ore sold:												
Total—												
Long tons.....	18,281,727	15,774,552	7,267,434	8,507,118	549,287	225,010	324,277	1,957,888	518,293	51,952	1,387,643	
Value.....	\$56,660,170	\$51,195,872	\$22,435,862	\$28,760,010	\$675,831	\$254,946	\$420,885	\$4,788,467	\$560,587	\$134,535	\$4,093,345	
Average value per ton ..	\$3.10	\$3.25	\$3.09	\$3.38	\$1.23	\$1.13	\$1.30	\$2.45	\$1.08	\$2.59	\$2.95	
F. o. b. mine—												
Long tons.....	4,350,695	2,133,504	443,977	1,689,527	544,701	222,374	322,327	1,672,490	515,781	48,752	1,107,957	
Value.....	\$9,117,482	\$4,719,094	\$649,360	\$4,069,734	\$665,764	\$248,689	\$417,075	\$3,732,624	\$554,314	\$126,535	\$3,051,775	
Average value per ton ..	\$2.10	\$2.21	\$1.46	\$2.41	\$1.22	\$1.12	\$1.29	\$2.23	\$1.07	\$2.60	\$2.75	
F. o. b. market—												
Long tons.....	13,931,032	13,641,048	6,823,457	6,817,591	4,586	2,636	1,950	285,398	2,512	3,200	279,686	
Value.....	\$47,542,688	\$46,476,778	\$21,786,502	\$24,690,276	\$10,067	\$6,257	\$3,810	\$1,055,843	\$6,273	\$8,000	\$1,041,570	
Average value per ton ..	\$3.41	\$3.41	\$3.19	\$3.62	\$2.20	\$2.37	\$1.95	\$3.70	\$2.50	\$2.50	\$3.72	
Total ore used in affiliated blast furnaces or sold.												
Long tons.....	50,521,208	41,242,374	28,314,713	12,927,661	5,181,605	4,312,360	869,245	4,097,229	664,813	837,625	2,594,791	
Gross value, including that of by- products ⁴	\$159,871,861	\$143,568,304	\$97,902,827	\$45,665,477	\$6,192,574	\$5,022,008	\$1,170,566	\$10,110,983	\$795,322	\$1,708,835	\$7,606,826	
Deductions for haulage, freight, commissions, and storage.....	52,924,779	51,351,452	40,826,692	10,524,760	107,066	82,859	24,207	1,466,261	6,026	25,832	1,434,403	
Net value at mine.....	106,947,082	92,216,852	57,076,135	35,140,717	6,085,508	4,939,149	1,146,359	8,644,722	789,296	1,683,003	6,172,423	
Average value per ton ..	2.12	2.24	2.02	2.72	1.17	1.15	1.32	2.11	1.19	2.01	2.38	

¹ Embraces Michigan and Wisconsin.

² Embraces Georgia and Tennessee.

³ Embraces Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Texas, Utah, West Virginia, and Wyoming.

* The value of by-products of iron mines has been included in the gross value of iron ore in order that statistics for individual operators might not be disclosed.

It is noteworthy that in some of the states the average values given for ore used in blast furnaces affiliated with and located at the mines are materially lower than the values of ore sold f. o. b. mine, but that the opposite is the case in other states. These variations may be due to differences in practice as to the assignment of values to ore used in blast furnaces affiliated with the mines, which may in some cases be based on market prices and in other cases on arbitrary prices. There are, however, differences in the qualities of ores which affect the values and render all such comparisons of little significance unless much more detailed information is available than appears in Table 30.

According to the table the average net value at the mine of all ore of the Lake Superior district was, in 1909, \$2.24, while the average for all ore of the southern district was very much lower, \$1.17. This difference is largely attributable to difference in the quality of the ore, that of the Lake Superior district containing in general a larger percentage of iron.

With reference to the value of by-products, it may be noted that the great bulk of the total value of by-

products shown for the United States (\$407,508) was reported from Wisconsin and largely represented manganese ore.

Haulage, freight, commissions, and storage.—The total deductions shown in Table 30 were charged against by-products as well as against the iron ore itself. Table 31 shows, by states, the expenses of haulage and freight, the quantity of ore shipped upon which these expenses were charged, and the average expense per ton. The figures as to the amount of ore represent iron ore and also manganese ore reported as a by-product in the state of Wisconsin.

As is shown in Table 31, the highest average expense per ton for haulage and freight, \$1.49, was borne by ore from Minnesota, and the lowest, \$0.13, by ore from Alabama. This difference is due to the fact that most of the ore from Minnesota was transported a long distance to blast furnaces located in the vicinity of coal mines, mainly in Illinois, Indiana, Ohio, Pennsylvania, and New York, while in Alabama the iron and coal mines are in close proximity and the blast furnaces are therefore at or not very far from the mines.

Table 31

DISTRICT AND STATE.	PRODUCING IRON MINES: 1909		
	Ore shipped on which freight and haulage were reported (long tons).	Expenses for haulage and freight.	
		Amount.	Average per ton.
United States	140,129,382	\$51,969,424	\$1.30
LAKE SUPERIOR DISTRICT:			
Michigan	10,334,415	9,387,925	0.91
Minnesota	27,115,947	40,347,573	1.49
Wisconsin	1,808,759	663,020	0.82
SOUTHERN DISTRICT:			
Alabama	637,325	82,859	0.13
Tennessee	69,195	23,172	0.33
OTHER STATES:			
Maryland	1,614	839	0.52
Missouri	25,818	6,198	0.24
New Jersey	141,406	108,438	0.77
New York	152,012	72,746	0.48
Pennsylvania	11,660	6,026	0.52
Utah	33,784	13,527	0.40
Virginia	79,623	25,832	0.32
All other ¹	717,824	1,231,269	1.72

¹ Includes manganiferous ore reported as a by-product of iron mines in Wisconsin.
² Embraces Colorado, Georgia, Nevada, New Mexico, North Carolina, Ohio, and Wyoming.

The deductions for storage and commissions were practically confined to ore shipped from Minnesota and Michigan, as is shown by Table 32, which gives for the United States, for Minnesota, and for Michigan, the tonnage of ore shipped upon which storage and commissions were reported, and the total amounts paid and the average per ton.

Table 32

STATE.	PRODUCING IRON MINES: 1909		
	Ore shipped on which commissions and storage were reported (long tons).	Commissions and storage charges.	
		Amount.	Average per ton.
United States	13,870,820	\$955,355	\$0.07
Minnesota	7,271,294	479,119	0.07
Michigan	6,071,129	450,627	0.07

Consumption of domestic ore compared with production.—Table 33 shows for 1909 the aggregate amount of ore reported by the mine operators as used or shipped for use in affiliated blast furnaces or sold, in comparison with the consumption as reported by the blast furnaces. The consumption shown for each district is not the consumption of the ore from that district, but that of the blast furnaces located in them.

Table 33

DISTRICT.	IRON ORE (LONG TONS): 1909	
	Output of mines in districts specified (quantity used and sold).	Consumption as reported by blast furnaces in the districts specified.
United States	50,521,208	47,429,236
Lake Superior district	41,242,374	1,324,447
Southern district	5,181,605	5,245,453
Other states	1,497,229	240,859,301

¹ Represents output for Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming.
² Represents consumption in Colorado, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, New York, Ohio, Pennsylvania, Texas, Virginia, and West Virginia.

It is noteworthy that the consumption reported by blast furnaces was considerably less than the output (used or sold) reported by mines. A good deal of the ore shipped from the Lake Superior district, whether for sale or for use in affiliated blast furnaces, was evidently stored for later consumption either at the furnaces or at lower lake ports. The preceding table emphasizes the fact that most of the iron ore in the United States is consumed at a distance from the mines producing it. Of the ore produced in the Lake Superior district the great bulk is shipped to other districts. The Southern district is exceptional in that most of the ore is consumed near the point of production.

Affiliation of mines with blast furnaces.—Table 34 shows, by districts and states, the number of mines affiliated with blast furnaces, either adjoining or at a distance, and the number without blast furnaces affiliated.

Table 34

DISTRICT AND STATE.	NUMBER OF PRODUCING IRON MINES: 1909			
	Total.	With affiliated blast furnaces adjoining.	With affiliated blast furnaces at a distance.	Without affiliated blast furnaces.
United States	483	114	184	185
LAKE SUPERIOR DISTRICT	195	16	118	61
Michigan	83	13	35	35
Minnesota	101	3	80	21
Wisconsin	11	3	3	5
SOUTHERN DISTRICT	116	43	35	38
Alabama	52	17	18	17
Georgia	18	1	7	10
Tennessee	46	25	10	11
OTHER STATES	172	55	31	86
Colorado	1			1
Connecticut	1	1		
Kentucky	2	1		1
Maryland	13	1	1	11
Massachusetts	1	1		
Missouri	33		3	30
Nevada	1			1
New Jersey	10	4	2	4
New Mexico	1		1	
New York	19	5		14
North Carolina	1		1	
Ohio	4	1	1	2
Pennsylvania	19	6	7	6
Texas	1	1		
Utah	5			5
Virginia	58	34	13	11
West Virginia	1		1	
Wyoming	1		1	

From this table it can be seen that the majority of iron mines were connected with blast furnaces, although in most cases the furnaces were located at a considerable distance from the mines. The connection is usually one of common ownership or control only, each branch of the business being operated independently.

Not all of the ore produced from mines affiliated with blast furnaces is used in these blast furnaces. It is often necessary, for metallurgical reasons, to mix ores of different composition, which may necessitate the purchase of ore by blast furnaces which control mines. Even apart from this condition it often happens that blast furnaces supplied in the main from mines operated under the same control nevertheless find it necessary

to buy ore in the market, and conversely the mines may produce more ore than the affiliated furnaces can use. The disposition of the ore derived from mines connected with blast furnaces is shown for 1909 in Table 35.

Table 35

IRON ORE PRODUCED IN MINES AFFILIATED WITH BLAST FURNACES (LONG TONS): 1909

DISTRICT.	With blast furnaces adjoining			With blast furnaces at a distance.		
	Total.	Used by affiliated furnaces.	Sold.	Total.	Shipped for use by affiliated furnaces.	Sold.
United States.....	7,069,067	4,432,808	2,636,259	32,332,448	27,806,673	4,525,775
Lake Superior dist.....	2,031,891	103,574	1,928,317	29,268,327	25,354,248	3,904,079
Southern district.....	3,499,062	3,467,984	31,078	1,186,598	1,164,334	22,264
Other states ¹	1,538,114	861,250	676,864	1,877,523	1,278,691	599,432

¹ Embraces Connecticut, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia, West Virginia, and Wyoming.

As appears from Table 35, in the Lake Superior district more than nine-tenths of the total output of mines with affiliated blast furnaces adjoining was sold in the market, but in the Southern district only about 1 per cent. Of the mines which shipped their ore to distant furnaces operated under the same ownership, those of the Lake Superior district sold nearly 4,000,000 tons, or 13.3 per cent of their total shipments, whereas those of the Southern district sold but 1.9 per cent of the ore shipped. Of the total products of "Other states" 1,538,114 tons were reported by mines with blast furnaces adjoining.

Table 36 shows, by districts, the amount of iron ore sold in 1909 by operators of mines with affiliated blast furnaces, whether adjoining the mines or at a distance, and by operators of mines with no affiliated blast furnaces.

Table 36

IRON ORE SOLD BY OPERATORS (LONG TONS): 1909

DISTRICT.	Total.	With affiliated blast furnaces adjoining mines.	With affiliated blast furnaces at a distance from mines.	Not affiliated with blast furnaces.
United States.....	18,281,727	2,636,259	4,525,775	11,119,693
Lake Superior district.....	15,774,552	1,928,317	3,904,079	9,942,156
Southern district.....	549,287	31,078	22,264	496,945
Other states ¹	1,957,888	676,864	599,432	681,592

¹ Embraces Colorado, Kentucky, Maryland, Missouri, Nevada, New Jersey, New York, Ohio, Pennsylvania, Texas, Utah, and Virginia.

As shown by the table, about two-thirds of the total quantity of ore sold was shipped from mines not affiliated with blast furnaces, and about one-fourth from mines affiliated with blast furnaces located at a distance.

Consumption of domestic and foreign ore.—The domestic mines supplied practically the entire demand for iron ore in 1909, although foreign ore was imported to a limited extent, particularly for use in Pennsylvania. Small quantities of imported ore were also used in some of the states on the Atlantic seaboard, in California, in Ohio, and in Illinois. The details are shown in Table 37.

Table 37

IRON ORE CONSUMED IN BLAST FURNACES (LONG TONS): 1909

STATE.	Total.	Domestic ore.	Foreign ore.
United States.....	49,189,015	47,429,236	1,759,779
Pennsylvania.....	20,267,712	18,978,892	1,288,820
All other states:			
States using imported ore ¹	18,789,706	18,318,747	470,959
States using no imported ore ²	10,131,597	10,131,597	—

¹ Embraces California, Delaware, Illinois, Maryland, New Jersey, New York, and Ohio.

² Embraces Colorado, Connecticut, Georgia, Indiana, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.

SCALE OF PRODUCTION.

Classification of operators according to the number of wage earners employed.—Table 38, relating to the United States as a whole, classifies according to the number of wage earners employed all operators and

operators of producing and of nonproducing mines separately, and gives the number of wage earners employed by each group. In many cases a single operator has several mines.

Table 38

IRON MINES: 1909							
WAGE EARNERS PER OPERATOR.	Number of operators.	Wage earners.		WAGE EARNERS PER OPERATOR.	Number of operators.	Wage earners.	
		Number.	Percent distribution.			Number.	Per cent distribution.
All mines.....	191	52,983	100.0	Producing mines—Continued.			
No wage earners.....	4			1 to 5.....	12	39	0.1
Contract work.....	3			6 to 20.....	30	374	0.7
1 to 5.....	16	53	0.1	21 to 50.....	36	1,227	2.3
6 to 20.....	34	421	0.8	51 to 100.....	24	1,742	3.3
21 to 50.....	41	1,510	2.8	101 to 500.....	49	11,399	21.8
51 to 100.....	25	1,939	3.7	501 to 1,000.....	9	7,132	13.7
101 to 500.....	50	11,611	21.9	Over 1,000.....	9	30,317	58.0
501 to 1,000.....	9	7,132	13.5	Nonproducing mines.....	119	753	100.0
Over 1,000.....	9	30,317	57.2	1 to 5.....	4	14	1.9
Producing mines.....	176	52,230	100.0	6 to 20.....	4	47	6.2
No wage earners.....	4			21 to 50.....	7	261	34.7
Contract work.....	3			Over 50 and less than 500.....	4	431	57.2

¹ Includes 4 operators who also operated producing mines.

Table 39 classifies, by districts, all operators (including nonproducing operators) according to the number of wage earners employed, and gives the number of wage earners employed by each group.

Table 39

WAGE EARNERS PER OPERATOR.	PRODUCING AND NONPRODUCING IRON MINES: 1909		
	Number of operators.	Wage earners.	
		Number.	Per cent distribution.
United States.....	191	52,983	100.0
No wage earners.....	4		
Contract work.....	3		
1 to 5.....	16	53	0.1
6 to 20.....	34	421	0.8
21 to 50.....	41	1,510	2.8
51 to 100.....	25	1,939	3.7
101 to 500.....	50	11,611	21.9
501 to 1,000.....	9	7,132	13.5
Over 1,000.....	9	30,317	57.2
Lake Superior district ²	46	34,395	100.0
20 or less.....	6	61	0.2
21 to 50.....	6	243	0.7
51 to 100.....	3	231	0.7
101 to 500.....	21	4,950	14.4
Over 500.....	10	28,910	84.0
Southern district ³	47	8,180	100.0
20 or less.....	7	91	1.1
21 to 50.....	12	399	4.9
51 to 100.....	11	876	10.7
101 to 500.....	13	2,920	35.6
Over 500.....	4	3,904	47.7
Other states ⁴	101	10,398	100.0
No wage earners.....	4		
Contract work.....	3		
1 to 5.....	15	49	0.5
6 to 20.....	22	273	2.6
21 to 50.....	23	796	7.6
51 to 100.....	10	677	6.5
101 to 500.....	18	4,009	38.6
Over 500.....	6	4,594	44.2

¹ The difference of three between the total number of operators for the United States and the sum of the numbers for the districts and "Other states" is due to the elimination of the duplication in the United States total of those operators who had mines in more than one district.

² Embraces Michigan, Minnesota, and Wisconsin.

³ Embraces Alabama, Georgia, and Tennessee.

⁴ Embraces Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming.

The greatest degree of concentration was reported from the Lake Superior district, where 10 operators with over 500 wage earners each, employed 28,910, or over five-sixths of the total number of wage earners for that district. In the Southern district, and also in "Other states" taken together, between two-fifths and one-half of all wage earners were employed by operators employing more than 500 wage earners each. On the other hand, in each district, operators employing 20 wage earners or less reported but a small percentage of the total number employed.

Classification of operators according to value of products.—Table 40 classifies all operators of producing mines in 1909 according to value of products, and gives the value of products for each group.

As shown by the table, 15 operators, with an output valued at over \$1,000,000 each, reported over 80 per cent of the total value of the products of iron mines, while operators with an output valued at less than \$100,000 each reported less than 3 per cent of the total. In the Lake Superior district 13 operators, with products valued at \$1,000,000 or more each, reported an aggregate output exceeding \$85,000,000 in value, and representing 92.3 per cent of the total for the

district. In the Southern district and in "Other states," however, operators with products less than \$100,000 in value, contributed over one-sixth of the total product as measured by value.

Table 40

VALUE OF PRODUCTS PER OPERATOR.	IRON MINES: 1909		
	Number of operators.	Value of products.	
		Amount.	Per cent distribution.
United States.....	176	\$106,947,082	100.0
Less than \$1,000.....	21	11,007	(¹)
\$1,000 but less than \$10,000.....	39	175,581	0.2
\$10,000 but less than \$100,000.....	63	2,647,340	2.5
\$100,000 but less than \$500,000.....	26	6,446,697	6.0
\$500,000 but less than \$1,000,000.....	12	7,577,126	7.1
\$1,000,000 and over.....	15	90,089,331	84.2
Lake Superior district ²	38	92,216,852	100.0
Less than \$100,000.....	8	281,614	0.3
\$100,000 but less than \$500,000.....	11	2,701,133	2.9
\$500,000 but less than \$1,000,000.....	6	4,073,860	4.4
\$1,000,000 and over.....	13	85,160,245	92.3
Southern district ³	47	8,085,508	100.0
Less than \$1,000.....	5	4,061	0.1
\$1,000 but less than \$10,000.....	11	54,960	0.9
\$10,000 but less than \$100,000.....	22	965,077	15.8
\$100,000 but less than \$500,000.....	5	1,155,211	19.0
\$500,000 and over.....	4	3,906,199	64.2
Other states ⁴	95	8,644,722	100.0
Less than \$1,000.....	16	6,946	0.1
\$1,000 but less than \$10,000.....	28	117,698	1.4
\$10,000 but less than \$100,000.....	35	1,482,939	17.2
\$100,000 but less than \$500,000.....	11	3,030,533	35.0
\$500,000 and over.....	5	4,006,606	48.3

¹ The difference of four between the total number of operators for the United States and the sum of the numbers for the districts and "Other states" is due to the elimination of the duplication in the United States total of those operators who had mines in more than one district.

² Less than one-tenth of 1 per cent.

³ Embraces Michigan, Minnesota, and Wisconsin.

⁴ Embraces Alabama, Georgia, and Tennessee.

⁵ Embraces Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming.

Mines operated by proprietors who perform manual labor.—Notwithstanding the large scale on which iron mining is usually conducted, a few operators were reported who personally performed manual labor in the mines, and in some few cases they had no hired labor to assist them. The mines so operated were distributed among the following states: Missouri, 19; Maryland, 9, of which 4 were operated by the proprietors alone without hired labor; Ohio, 1; and Pennsylvania, 1. A summary of the statistics for mines of this class of operators is presented in Table 41.

Table 41

	PRODUCING IRON MINES OPERATED BY PROPRIETORS PERFORMING MANUAL LABOR: 1909		
	Total.	Without hired labor.	With hired labor.
Number of operators.....	16	4	12
Number of mines.....	30	4	26
Persons engaged in the industry.....	168	7	161
Proprietors and firm members.....	25	7	18
Number performing manual labor.....	24	7	17
Salaried employees.....	4		4
Wage earners.....	139		139
Primary horsepower owned.....	24		24
Capital.....	\$79,540	\$115	\$79,425
Expenses of operation and development.....	\$24,621	\$205	\$24,416
Salaries.....	\$1,075		\$1,075
Wages.....	\$17,572		\$17,572
Supplies and materials.....	\$2,868	\$26	\$2,842
Royalties and rent of mines.....	\$2,074	\$154	\$1,920
Taxes.....	\$77		\$77
Contract work.....	\$50		\$50
All other.....	\$905	\$25	\$880
Products sold:			
Quantity (long tons).....	12,095	373	11,722
Value.....	\$24,920	\$1,045	\$23,875

As appears from the preceding table every proprietor of mines of this class except one performed some manual labor in the mines. In addition, such proprietors did nearly all of the supervisory and clerical work, only 4 salaried employees being employed by the 16 operators. There were 4 operators who performed the work connected with their mines without hired labor. Where wage earners were employed the aver-

age number was 12 per operator. These mines were operated practically without mechanical power, and most of them were in operation only a small part of the year. One operator ran his mines 30 days or less; 2 between 30 and 60 days; 1 between 60 and 90 days; 5 between 90 and 120 days; 2 between 120 and 150 days; 2 between 150 and 180 days; 2 between 180 and 210 days; and 1 between 240 and 270 days.

CHARACTER OF ORGANIZATION.

Comparative summary for the United States: 1909 and 1902.—Table 42 presents a comparative summary for producing operators by character of organization

in 1909 and 1902. This table does not include one governmental institution for 1902; there were none reported for 1909.

Table 42	CHARACTER OF ORGANIZATION.	Census year.	PRODUCING IRON MINES: 1909 AND 1902							Value of products.
			Number of mines.	Expenses of operation and development.						
				Total.	Salaries.	Wages.	Supplies and materials.	Contract work.	All other. ¹	
Total ²	1909	483	\$74,071,830	\$3,389,962	\$29,731,456	\$17,229,717	\$2,698,842	\$21,021,853	\$106,947,082	
	1902	524	41,294,525	2,109,807	21,531,792	8,973,168	422,044	8,257,714	65,460,985	
Incorporated operators ²	1909	417	73,751,594	3,374,806	29,551,434	17,152,414	2,674,798	20,998,142	106,581,936	
	1902	392	39,606,977	2,000,456	20,504,967	8,538,596	418,176	8,144,782	63,303,407	
Per cent of total.....	1909	86.3	99.6	99.6	99.4	99.6	99.1	99.9	99.7	
	1902	74.8	95.9	94.8	95.2	95.2	99.1	98.6	96.7	
Unincorporated operators.....	1909	66	320,236	15,156	180,022	77,303	24,044	23,711	365,146	
	1902	132	1,687,548	109,351	1,026,825	434,572	8,868	112,932	2,157,578	

¹ Includes interest in 1902, of which \$521,111 was interest paid on bonds.

² Exclusive of governmental institutions.

³ Includes 1 limited partnership and 1 cooperative association.

The corporate was the predominant form of organization in iron mines in both 1909 and 1902. During the seven years a marked absolute decrease occurred in the business of enterprises not under corporate control. Unincorporated operators reported in 1909 only a fraction of 1 per cent of the value of products.

General summary, by states: 1909.—Table 43 presents a general summary of the statistics for operators

of producing mines, classified by character of organization, for the United States and for the principal states having both incorporated and unincorporated operators in 1909. In Connecticut, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New Mexico, North Carolina, Tennessee, Texas, Utah, Wisconsin, and Wyoming all the mines were operated by incorporated companies.

GENERAL SUMMARY FOR OPERATORS OF PRODUCING MINES, CLASSIFIED ACCORDING TO CHARACTER OF ORGANIZATION, FOR THE UNITED STATES AND FOR THE PRINCIPAL STATES HAVING BOTH INCORPORATED AND UNINCORPORATED OPERATORS: 1909.

Table 43 STATE AND CHARACTER OF ORGANIZATION.	Number of operators.	Number of mines.	LAND CONTROLLED (ACRES).			Capital.	EXPENSES OF OPERATION AND DEVELOPMENT.				
			Total.	Owned.	Leased.		Total.	Salaries.	Wages.	Supplies and materials.	Royalties and rent of mines.
United States:											
Incorporated ¹	130	417	1,274,785	1,038,623	236,162	\$299,862,084	\$73,751,594	\$3,374,806	\$29,551,434	\$17,152,414	\$15,166,190
Unincorporated.....	46	86	38,429	25,604	12,825	873,833	320,236	15,156	180,022	77,303	8,645
Alabama:											
Incorporated.....	20	46	57,901	53,134	4,767	22,370,318	4,004,857	322,087	2,687,855	1,090,335	89,351
Unincorporated.....	5	6	5,325	285	5,040	126,000	19,427	1,400	11,093	4,256	839
Georgia:											
Incorporated.....	6	12	72,343	72,153	190	3,997,192	277,235	32,710	141,448	72,778	16,893
Unincorporated.....	5	6	1,340	120	1,220	21,200	27,294	2,160	15,110	2,412	1,575
Missouri:											
Incorporated.....	6	9	89,503	89,120	383	3,016,000	105,835	9,495	66,729	16,420	10,576
Unincorporated.....	10	24	2,097	1,137	960	151,225	45,001	750	32,930	8,771	1,457
Pennsylvania:											
Incorporated ²	9	12	5,659	864	4,795	7,053,458	282,308	20,179	139,705	70,423	1,480
Unincorporated.....	6	7	12,499	12,436	63	71,489	95,275	2,070	27,328	40,377	1,604
Virginia:											
Incorporated.....	12	53	95,295	58,255	37,040	6,323,807	1,478,352	55,094	817,308	323,659	146,877
Unincorporated.....	5	5	1,084	132	952	151,580	32,861	2,656	25,698	1,583	1,253

STATE AND CHARACTER OF ORGANIZATION.	EXPENSES OF OPERATION AND DEVELOPMENT—continued.			Ore used and sold (long tons).	Value of all products.	PERSONS ENGAGED IN INDUSTRY.						Primary horse-power owned.
	Taxes.	Contract work.	Rent of offices and sundries.			Aggregate.	Proprietors and officials.			Clerks and other subordinate salaried employees.	Wage earners.	
							Total.	Proprietors and firm members.	Salaried officers of corporations, superintendents and managers.			
United States: Incorporated ¹ Unincorporated.....	\$3,966,721 3,634	\$2,674,798 24,044	\$1,865,231 11,532	50,338,481 182,727	\$106,581,936 365,146	54,149 1,027	1,019 80	76	1,019 14	1,825 12	51,305 925	338,875 3,194
Alabama: Incorporated..... Unincorporated.....	36,962 89	3,950 1,750	368,317	4,297,467 14,893	4,915,743 23,406	5,874 158	171 9	7	171 2	184 2	5,519 147	31,101 737
Georgia: Incorporated..... Unincorporated.....	3,045 20		10,361 6,017	204,780 15,196	308,324 22,854	696 166	21 11	8	21 3	13 2	662 153	3,345 151
Missouri: Incorporated..... Unincorporated.....	262 548	654 445	1,699 100	58,996 27,958	140,022 63,827	212 146	7 18	16	7 2	6	199 128	255 148
Pennsylvania: Incorporated ² Unincorporated.....	18,097 1,318	30,285 20,709	2,139 1,869	623,699 41,114	692,454 96,842	635 129	15 13	12	15 1	8 2	612 114	3,171 800
Virginia: Incorporated..... Unincorporated.....	16,329 236	700 245	118,415 1,190	825,647 11,978	1,657,857 25,146	3,029 131	36 7	6	36 1	38 2	2,955 122	6,130 328

¹ Includes 1 cooperative association in Pennsylvania and 1 limited partnership in Tennessee.

² Includes 1 cooperative association.

Land tenure, by character of organization.—Table 44 presents statistics as to the land held by incorporated and unincorporated operators, respectively.

Of the total land reported (1,313,214 acres) 1,274,785 acres, or 97.1 per cent, were connected with the enterprises controlled by incorporated companies.

Table 44 TENURE AND CHARACTER OF LAND.	ACREAGE CONTROLLED BY OPERATORS OF PRODUCING IRON MINES: 1909			TENURE AND CHARACTER OF LAND.	ACREAGE CONTROLLED BY OPERATORS OF PRODUCING IRON MINES: 1909		
	Total.	Incorporated. ¹	Unincorporated.		Total.	Incorporated. ¹	Unincorporated.
Total.....	1,313,214	1,274,785	38,429	Leased.....	248,987	236,162	12,825
Owned.....	1,064,227	1,038,623	25,604	Mineral.....	104,947	95,279	9,668
Mineral.....	282,661	273,755	8,906	Timber.....	80,273	77,196	3,077
Timber.....	376,409	360,321	16,088	Other.....	63,767	63,687	80
Other.....	405,157	404,547	610				

¹ Includes 1 limited partnership and 1 cooperative association.

MINES AND QUARRIES.

METHODS OF MINING.

Open-pit and underground mines.—The principal division of iron mines according to the method of mining is that between open-pit and underground mines. Table 45 shows the total production of ore (gross) in 1909 according to method of mining.

STATE.	IRON ORE MINED (LONG TONS): 1909		
	Total.	Open-pit mines.	Underground mines.
United States.....	51,947,129	24,150,491	27,796,638
Alabama.....	4,687,468	1,128,984	3,558,484
Maryland.....	22,704	22,704	
Michigan.....	11,992,693	319,681	11,673,012
Minnesota.....	29,127,918	19,859,105	9,258,813
New Jersey.....	536,958		536,958
New York.....	1,238,720	123,893	1,114,827
Pennsylvania.....	665,642	621,169	44,473
Tennessee.....	649,394	374,875	274,519
Utah.....	33,784		33,784
Virginia.....	841,709	570,677	271,032
All other states.....	2,150,139	1,119,403	1,030,736

¹ This quantity represents crude ore as it came from the mine. A part of it was concentrated before shipment, the reduction in weight amounting to 229,209 tons.

² Includes a small quantity of ore (less than 1 per cent of the total output of the state) in Minnesota which was classified as "milling" ore by the operator.

³ Embraces Georgia, Kentucky, Missouri, Nevada, New Mexico, Ohio, Texas, West Virginia, Wisconsin, and Wyoming for open-pit mines, and Colorado, Connecticut, Georgia, Massachusetts, Missouri, North Carolina, Ohio, and Wisconsin for underground mines.

It appears from the table that in the United States as a whole about one-half of the total production was contributed by open-pit mines, about five-sixths of this amount being produced in Minnesota.¹

Table 46 gives a comparative summary of the statistics as to expenses and other subjects for open-pit and underground mines, for the United States as a whole and for the Lake Superior and Southern districts separately, so far as separate reports were secured. In a good many cases a single operator had both classes of mines and made only a combined report for both, except that the quantity mined by each method was distinguished. As the table comprises 385 of the 483 producing iron mines, with an aggregate output of 56.8 per cent of the total for the United States, the data may be regarded as fairly representative for each method of mining.

¹ The total production of open-pit mines in Minnesota included a small quantity of ore—less than 1 per cent of the total output of the state—which was classified as "milling" ore. Under the "milling" system the surface earth is removed, and the ore is thrown into drifts located below the top of the ore, thus making large sinks or craters.

SUMMARY FOR PRODUCING MINES, CLASSIFIED ACCORDING TO METHOD OF MINING, BY DISTRICTS: 1909.¹

	UNITED STATES.		LAKE SUPERIOR DISTRICT.		SOUTHERN DISTRICT.	
	Open-pit mines.	Underground mines.	Open-pit mines.	Underground mines.	Open-pit mines.	Underground mines.
Number of mines.....	175	210	23	110	57	42
Number of wage earners.....	9,045	30,136	1,883	20,130	3,445	4,463
Average number per mine.....	52	144	81	183	60	106
Primary horsepower owned.....	51,229	165,314	22,079	121,350	16,129	24,676
Capital.....	\$46,412,586	\$97,570,820	\$18,033,857	\$66,429,767	\$11,547,985	\$16,693,274
Expenses of operation and development.....	\$7,822,656	\$35,760,448	\$3,694,325	\$27,996,084	\$1,955,061	\$3,725,171
Services.....	\$3,810,401	\$19,317,982	\$1,211,307	\$14,419,214	\$1,303,836	\$2,438,749
Salaries.....	\$435,761	\$1,742,846	\$161,595	\$1,289,210	\$167,977	\$255,481
Wages.....	\$3,374,640	\$17,575,136	\$1,049,712	\$13,130,004	\$1,135,859	\$2,183,268
Supplies and materials.....	\$1,581,166	\$8,234,566	\$586,353	\$6,080,283	\$453,061	\$888,556
Royalties and rent of mines.....	\$1,345,064	\$5,194,624	\$1,136,155	\$5,050,772	\$55,750	\$73,002
Taxes.....	\$388,919	\$1,167,462	\$324,584	\$1,087,484	\$20,133	\$26,229
Contract work.....	\$347,041	\$569,122	\$304,078	\$526,966	\$5,700	
Miscellaneous.....	\$350,065	\$1,270,692	\$131,248	\$831,305	\$116,581	\$298,635
Ore used and sold (long tons).....	8,601,936	20,075,010	4,866,570	14,775,431	1,700,040	3,430,778
Value of ore used and sold and of by-products.....	\$11,745,593	\$48,235,771	\$6,633,315	\$39,269,115	\$2,341,922	\$3,673,564
Ore mined:						
Quantity (long tons).....	8,540,709	20,745,490	4,799,060	15,040,384	1,677,238	3,819,324
Estimated value.....	\$11,701,000	\$49,789,000	\$6,527,000	\$40,007,000	\$2,315,000	\$4,087,000
Average tonnage per mine.....	48,804	98,788	208,655	136,731	29,425	90,936
Average expenses per ton mined.....	\$0.92	\$1.72	\$0.77	\$1.86	\$1.16	\$0.98
Salaries.....	0.05	0.08	0.03	0.09	0.10	0.07
Wages.....	0.40	0.85	0.22	0.87	0.68	0.57
Supplies and materials.....	0.19	0.40	0.12	0.40	0.27	0.23
Royalties and rent of mines.....	0.16	0.25	0.24	0.34	0.03	0.02
Taxes.....	0.05	0.06	0.07	0.07	0.01	0.01
Contract work.....	0.04	0.03	0.06	0.04		
Miscellaneous.....	0.04	0.06	0.03	0.06	(*) 0.07	0.08

¹ Exclusive of operators using both methods of mining and making combined reports.

² This value has been estimated from the average value per ton at the mine of ore used and sold.

³ Less than 1 cent.

The economy naturally resulting from open-pit mining appears from the table. For the United States as a whole the average wages per ton mined amounted to \$0.40 for open-pit mines, as compared with \$0.85 for underground mines, and the cost of supplies and materials averaged \$0.19 per ton in open-pit mines and \$0.40 per ton in underground mines. The differences appear in a still more marked degree when the Lake Superior district is considered by itself. In that district the average wages per ton for open-pit mines were about one-fourth, and the average expenses for supplies and materials less than one-third, of the corre-

sponding averages for underground mines. In the Southern district, on the other hand, the average expenses for open-pit mines were somewhat higher than for underground mines.

Use of machinery in mining.—The increase in the production of iron ore has been due largely to the introduction of improved machinery, namely, steam shovels in open-pit mines and power drills in underground mines. Some mines, however, still use hand drills. A comparative summary of the principal data for mines classified according to the character of machinery used is presented in Table 47.

CHARACTER OF MACHINERY USED.	PRODUCING IRON MINES: 1909				
	Number of mines.	Wage earners.	Capital.	Primary horsepower owned.	Ore mined (long tons).
Total	483	52,230	\$300,735,917	342,069	51,947,129
Mines using:					
Steam shovels or power drills, or both.....	335	47,645	256,429,044	332,035	49,048,469
Hand drills, with mechanical power for other purposes.....	94	3,828	12,087,085	10,034	2,764,649
Hand drills, without mechanical power.....	54	757	1,618,888	.....	134,011
Per cent of total reported for mines using:					
Steam shovels or power drills, or both.....	69.4	91.2	95.2	97.1	94.4
Hand drills, with mechanical power for other purposes.....	19.5	7.3	4.2	2.9	5.3
Hand drills, without mechanical power.....	11.2	1.4	0.5	.....	0.3
Average per mine for mines using:					
Total.....		108	\$622,642	708	107,551
Steam shovels or power drills, or both.....		142	\$55,015	991	140,413
Hand drills, with mechanical power for other purposes.....		41	134,969	107	29,411
Hand drills, without mechanical power.....		14	29,979	.....	2,482

The preceding table shows that steam shovels or power drills or both were used in about seven-tenths of the iron mines, and that these mines produced 94.4 per cent of the ore mined and gave employment to 91.2 per cent of all wage earners engaged in iron mining. Hand drilling exclusively was reported from 30.6 per cent of all mines, but their production formed only 5.6 per cent of the total ore mined and the wage earners employed by them constituted only 8.7 per cent of the total number of wage earners engaged in the industry. The mines using hand drills and without mechanical power for other purposes were all small mines, their average output being less than 2,500 tons in 1909. These mines produced only 0.3 per cent of the total quantity of ore mined in 1909 and gave employment to 1.4 per cent of the total number of wage earners engaged in iron mining.

Mines using steam shovels.—Table 48 gives a summary for open-pit mines using exclusively steam shovels for shoveling ore. This table does not include the statistics of open-pit mines which were operated under the same management as underground mines and were not reported separately. A comparative study of the principal items of expense shows that the average wages per ton mined were \$0.48 for open-pit mines using steam shovels, as compared with an average of \$0.57 per ton for all producing mines, open-pit and underground; and that the average cost of sup-

plies and materials per ton of ore mined by steam shovels was \$0.23, as compared with \$0.33 per ton for all producing mines.

	Number or amount.
Number of operators.....	17
Number of mines.....	59
Number of wage earners, Dec. 15, 1909, or nearest representative day:	
Total.....	4,175
Average per mine.....	76
Primary horsepower owned:	
Total.....	17,461
Average per mine.....	294
Capital:	
Total.....	\$25,797,400
Average per mine.....	\$437,244
Expenses of operation and development.....	\$3,776,517
Services.....	\$1,919,201
Salaries.....	120,085
Wages.....	\$1,099,116
Supplies and materials.....	816,669
Royalties and rent of mines.....	\$77,138
All other.....	\$63,399
Quantity of ore mined (long tons):	
Total.....	351,170
Average per mine.....	59,422
Value of products used and sold.....	\$5,037,473

Mines without mechanical power.—A survival of the primitive methods of mining appears in the case of 54 mines in which, in 1909, all the drilling was done by hand and no power was used for hoisting or other purposes. While the value of the total output of these mines was less than \$250,000, yet they are of interest as affording a comparison between modern methods of mining and those of an earlier day. The amount of wages per ton mined in these 54 mines averaged \$1.10, as compared with \$0.48 per ton for mines using exclusively steam shovels for shoveling ore, and with \$0.57 for all producing mines. The cost of supplies for these 54 mines averaged \$0.41 per ton, as compared with \$0.23 per ton for the mines using steam shovels covered by Table 48, and with \$0.33 for all producing mines.

A summary of the statistics for mines without mechanical power is presented in Table 49.

	Number or amount.
Number of operators.....	48
Number of mines.....	54
Number of wage earners, Dec. 15, 1909, or nearest representative day:	
Total.....	767
Average per mine.....	14
Capital:	
Total.....	\$1,018,888
Average per mine.....	\$29,979
Expenses of operation and development.....	\$256,183
Services.....	\$109,010
Salaries.....	\$21,263
Wages.....	\$117,747
Supplies and materials.....	\$35,212
Royalties and rent of mines.....	\$5,297
All other.....	\$26,664
Quantity of ore mined (long tons):	
Total.....	134,011
Average per mine.....	2,482
Value of products used and sold.....	\$18,073

GENERAL TABLE.

Table 50 contains a detailed presentation, for 1909, of the statistics for iron mines in the United States as a whole, in each of the main producing districts, and in each state of any importance in the industry. It shows separately those mines which produced ore in 1909, and those in which all operations were confined to

development work. It gives the number of operators and of mines; the acreage of land controlled, according to tenure; the expenses of operation and development; the quantity and value of products; and detailed statistics with regard to persons engaged in the industry and with regard to power and machinery.

DETAILED STATISTICS OF IRON MINES, BY

Table 50				LAND CONTROLLED (ACRES).											
DISTRICT AND STATE.		Number of operators.	Number of mines.	All land.			Mineral land.			Timber land.			Other land.		
				Total.	Owned.	Leased.	Total.	Owned.	Leased.	Total.	Owned.	Leased.	Total.	Owned.	Leased.
1	All mines.....	181	504	1,343,634	1,087,865	255,769	416,016	306,257	109,759	456,682	376,409	80,273	470,936	405,199	65,737
2	Producing.....	176	483	1,313,214	1,064,227	248,987	387,608	282,661	104,947	456,682	376,409	80,273	468,924	405,157	63,767
3	Nonproducing.....	19	21	30,420	23,638	6,782	28,408	23,596	4,812	.....	.....	.....	2,012	42	1,970
Producing:															
4	LAKE SUPERIOR DIST.	50	195	600,283	442,428	157,855	39,624	13,338	26,286	252,713	181,517	71,196	307,946	247,573	60,373
5	Michigan.....	24	83	247,656	223,419	24,237	17,205	4,464	12,741	162,248	154,384	7,864	68,203	64,571	3,632
6	Minnesota.....	20	101	332,233	201,386	130,847	14,336	2,510	11,826	80,302	22,970	63,332	231,595	175,906	55,689
7	Wisconsin.....	6	11	20,394	17,623	2,771	8,083	6,364	1,719	4,163	4,163	.....	8,148	7,096	1,052
8	SOUTHERN DISTRICT.	51	116	212,165	190,699	21,466	136,820	121,498	15,322	25,996	19,996	6,000	49,349	49,205	144
9	Alabama.....	25	52	63,226	53,419	9,807	52,000	42,337	9,663	4,746	4,746	.....	6,480	6,336	144
10	Georgia.....	11	18	73,683	72,273	1,410	70,570	69,160	1,410	.....	.....	.....	3,113	3,113	.....
11	Tennessee.....	15	46	75,256	65,007	10,249	14,250	10,001	4,249	21,250	15,250	6,000	39,756	39,756	.....
12	OTHER STATES	100	172	500,766	431,100	69,666	211,164	147,825	63,339	177,973	174,896	3,077	111,629	108,379	3,250
13	Maryland.....	12	13	10,580	10,490	90	180	90	90	10,000	10,000	.....	400	400	.....
14	Missouri.....	16	33	91,600	90,257	1,343	12,353	11,167	1,186	957	880	77	78,290	78,210	80
15	New Jersey.....	8	10	13,668	5,169	8,499	12,968	4,469	8,499	660	660	.....	40	40	.....
16	New York.....	14	19	247,783	239,564	8,219	95,920	87,701	8,219	131,633	131,633	.....	20,230	20,230	.....
17	Ohio.....	4	4	4,390	4,310	80	4,390	4,310	80	.....	.....	.....	.....	.....	.....
18	Pennsylvania.....	15	19	18,158	13,300	4,858	12,089	7,231	4,858	6,065	6,065	.....	4	4	.....
19	Utah.....	3	5	268	268	.....	268	268	.....	.....	.....	.....	.....	.....	.....
20	Virginia.....	17	58	96,379	58,387	37,992	64,206	26,384	37,822	22,953	22,953	.....	9,220	9,050	170
21	All other 7	11	11	17,940	9,355	8,585	8,790	6,205	2,585	5,705	2,705	3,000	3,445	445	3,000
Nonproducing:															
22	Minnesota.....	8	9	1,589	200	1,389	1,469	200	1,269	.....	.....	.....	120	.....	120
23	Missouri.....	3	4	24,368	21,168	3,200	24,368	21,168	3,200	.....	.....	.....	.....	.....	.....
24	All other 8	8	8	4,463	2,270	2,193	2,571	2,228	343	.....	.....	.....	1,892	42	1,850

PERSONS ENGAGED IN INDUSTRY.

DISTRICT AND STATE.			Wage earners, December 15, or nearest representative day.																		Boys under 16 years of age.				
			Proprietors and officials.					Aggregate.			Men 16 years of age and over.														
			Aggregate.	Total.	Proprietors and firm members.		Clerks and other subordinate salaried employees.	Total.	Above ground.	Below ground.	All classes.			Engineers, firemen, and mechanics.			Miners and miners' helpers.			Other wage earners.					
					Total.	Above ground.					Below ground.	Total.	Above ground.	Below ground.	Total.	Above ground.	Below ground.	Total.	Above ground.	Below ground.				Total.	Above ground.
1	All mines.....	55,980	1,132	81	1,051	1,865	52,983	25,453	27,530	52,494	25,133	27,361	7,270	6,783	487	25,191	4,854	20,337	20,033	13,496	6,537	489	320	169	
2	Producing.....	55,176	1,109	76	1,033	1,837	52,230	24,889	27,341	51,741	24,569	27,172	7,073	6,597	478	24,926	4,736	20,190	19,742	13,236	6,506	489	320	169	
3	Nonproducing.....	804	23	5	18	28	753	564	189	753	564	189	197	186	11	265	118	147	291	260	31	.....	.....	.....
4	Producing: -																								
5	LAKE SUPERIOR DIST.	35,886	660	.....	660	1,428	33,798	14,357	19,441	33,773	14,345	19,428	4,515	4,286	229	14,349	446	13,903	14,909	9,613	5,296	25	12	13
6	Michigan.....	16,931	312	.....	312	494	16,125	4,665	11,460	16,104	4,657	11,447	1,705	1,544	161	7,853	87	7,766	6,546	3,026	3,520	21	8	13
7	Minnesota.....	17,438	330	.....	330	890	16,218	9,280	6,938	16,214	9,276	6,938	2,660	2,610	50	5,625	289	5,336	7,929	6,377	1,552	4	.....	.....
8	Wisconsin.....	1,517	18	.....	18	44	1,455	412	1,043	1,455	412	1,043	150	132	18	871	70	801	434	210	224	.....	.....	.....
9	SOUTHERN DISTRICT.	8,629	250	15	235	239	8,140	4,894	3,246	7,769	4,662	3,107	1,230	1,100	130	3,840	1,436	2,404	2,699	2,126	573	371	232	139	
10	Alabama.....	6,032	180	7	173	186	5,666	3,044	2,622	5,404	2,907	2,497	972	845	127	2,391	528	1,863	2,041	1,534	507	262	137	125	
11	Georgia.....	862	32	8	24	15	815	750	65	788	723	65	101	101	.....	358	203	65	329	329	.....	27	27	.....
12	Tennessee.....	1,735	38	.....	38	38	1,659	1,100	559	1,577	1,032	545	157	154	3	1,091	615	476	329	263	66	82	68	14
13	OTHER STATES	10,661	199	61	138	170	10,292	5,638	4,654	10,199	5,562	4,637	1,328	1,211	117	6,737	2,854	3,883	2,134	1,497	637	93	76	17	
14	Maryland.....	146	20	18	2	1	125	125	.....	114	114	.....	6	6	.....	65	65	.....	43	43	.....	11	11	.....
15	Missouri.....	358	25	16	9	6	327	284	43	324	281	43	15	15	.....	281	238	43	28	28	.....	3	3	.....
16	New Jersey.....	2,148	23	.....	23	30	2,095	553	1,542	2,095	553	1,542	302	249	53	1,134	.....	1,134	659	304	355	.....	.....	.....
17	New York.....	2,637	34	1	33	61	2,542	1,049	1,493	2,541	1,049	1,492	356	322	34	1,400	158	1,242	755	569	216	1	.....	.....
18	Ohio.....	39	3	2	1	.....	36	19	17	36	19	17	1	1	.....	26	9	17	9	9	.....	.....	.....	.....
19	Pennsylvania.....	764	28	12	16	10	726	620	106	714	608	106	161	159	2	478	400	78	75	49	26	12	12	.....
20	Utah.....	81	3	.....	3	3	75	12	63	75	12	63	12	12	.....	63	.....	63	.....	.....	.....	.....	.....	.....
21	Virginia.....	3,160	43	6	37	40	3,077	2,332	845	3,011	2,182	829	363	349	14	2,346	1,562	784	302	271	31	66	50	16	
22	All other.....	1,328	20	6	14	19	1,289	744	545	1,289	744	545	112	98	14	944	422	522	233	224	9	.....	.....	.....
23	Nonproducing:																								
24	Minnesota.....	559	13	2	11	20	526	380	146	526	380	146	139	134	5	186	62	124	191	184	17	.....	.....	.....
25	Missouri.....	54	3	2	1	1	50	46	4	50	46	4	4	4	.....	44	40	4	2	2	.....	.....	.....	.....
26	All other.....	191	7	1	6	7	177	138	39	177	138	39	54	48	6	35	16	19	98	74	14	.....	.....	.....

¹ Includes a small amount reported for rent of power, which forms approximately 1 per cent of the total.

² Includes by-products with value of \$407,508, of which the greater part was manganiferous ore.

³ The difference of 4 existing between the number of operators for all mines and the sum of the numbers for producing and nonproducing mines is due to the fact that 4 operators reported both classes of mines.

⁴ Of this ore, 882,548 tons were concentrated at the mines, from which 653,339 tons of concentrate were derived.

⁵ The difference of 25 existing between the number of operators for producing mines and the sum of the numbers for the several states, is due to the elimination of the duplication in the United States total of those operators who had mines in more than one state.

DISTRICTS AND STATES: 1909.

EXPENSES OF OPERATION AND DEVELOPMENT.												PER CENT OF TOTAL.			ORE.		
Capital.	Total.	Services.		Supplies.		Miscellaneous.					Services.	Supplies.	Miscellaneous.	Total mined (long tons).	Used, shipped, and sold.		
		Salaries.		Wages.	Supplies and materials.	Fuel. ¹	Royalties and rent of mines.	Taxes.	Contract work.	Rent of offices and sundries.					Quantity (long tons).	Value, including by-products. ²	
		Salaried officers of corporations, superintendents, and managers.	Clerks and other subordinate salaried employees.														
1	\$305,586,756	\$74,934,131	\$1,768,057	\$1,655,935	\$30,047,986	\$12,835,310	\$4,715,963	\$15,210,335	\$4,004,319	\$2,762,617	\$1,833,809	44.7	23.4	31.9	\$1,947,129	50,521,208	\$108,947,082
2	300,735,917	74,071,830	1,749,989	1,639,973	29,731,456	12,597,428	4,632,289	15,174,735	3,970,355	2,698,842	1,876,763	44.7	23.3	32.0	\$1,947,129	50,521,208	108,947,082
3	4,850,839	862,301	18,068	15,962	318,530	237,882	83,674	35,600	33,964	63,775	56,846	40.7	37.3	22.0			
4	237,386,821	61,552,979	1,284,163	1,344,826	22,607,698	10,350,986	3,541,030	14,784,131	3,818,377	2,613,823	1,198,939	41.0	22.6	36.4	42,095,627	41,242,374	92,216,882
5	58,544,068	22,450,011	645,761	551,127	10,608,069	3,452,519	1,457,460	3,827,852	961,401	436,148	558,674	52.4	21.9	25.7	11,992,693	11,924,995	32,168,133
6	174,863,024	37,205,373	609,187	852,393	11,068,652	6,597,440	1,951,421	10,686,407	2,810,266	2,157,075	502,532	33.6	22.9	43.5	20,127,918	25,314,713	57,076,135
7	3,979,720	1,798,595	29,215	41,306	870,977	310,027	132,155	269,872	46,710	20,600	77,733	52.3	24.6	23.1	975,016	1,002,666	2,972,584
8	28,475,259	5,762,991	243,777	184,266	3,369,697	872,102	484,854	136,723	40,979	5,700	418,893	65.9	23.5	10.6	5,556,838	5,181,605	6,085,508
9	22,496,318	4,624,284	176,678	146,809	2,698,948	718,281	382,310	90,190	37,051	5,700	368,317	65.4	23.8	10.8	4,687,468	4,312,360	4,939,149
10	4,018,302	304,529	25,010	0,200	156,558	40,665	34,225	18,468	3,085		16,378	62.9	24.7	12.4	219,976	219,976	331,178
11	1,900,549	834,178	42,489	28,197	514,191	113,156	68,019	28,065	6,863		34,198	70.0	21.7	8.3	649,394	649,269	815,181
12	34,873,837	6,755,860	222,049	110,881	3,754,001	1,365,340	600,399	253,881	104,999	79,819	255,931	69.5	29.2	10.3	4,294,664	4,097,229	8,644,722
13	2,026,588	41,106	2,520	810	24,989	3,803	4,610	1,343	582	395	1,964	68.9	20.7	10.4	22,704	22,675	44,241
14	3,167,225	150,836	6,325	3,920	99,659	15,984	9,207	12,033	810	1,099	1,799	72.9	16.7	10.4	87,079	86,954	203,849
15	3,612,024	1,321,915	49,798	16,251	840,967	199,707	168,368	7,091	7,350		32,383	68.6	27.9	3.5	536,958	559,828	1,651,091
16	12,613,215	2,118,267	81,987	57,223	1,001,025	559,997	199,817	62,668	51,491	20,632	80,427	53.8	35.7	10.5	1,024,173	3,095,023	4,119,191
17	53,401	22,701	1,320		11,510	3,225		170	389	5,254	827	56.5	14.2	29.3	13,468	13,468	24,419
18	7,124,947	377,583	17,841	4,408	107,033	87,340	23,460	3,084	19,415	50,994	4,008	50.1	29.4	20.5	665,642	664,813	789,296
19	206,077	185,429	1,000	1,050	104,823	72,834	5,160		502		60	57.6	42.1	0.3	33,784	33,784	100,844
20	6,475,387	1,511,243	39,438	18,312	843,006	208,213	117,029	148,130	16,565	945	119,605	59.6	21.5	18.9	841,709	837,625	1,683,003
21	1,558,903	1,026,780	21,820	8,907	661,049	217,147	78,748	19,356	7,895		11,858	67.4	28.8	3.8	854,600	853,909	1,052,556
22	2,274,826	630,425	0,918	12,722	251,564	156,167	67,050	33,750	26,982	34,900	37,372	43.5	35.4	21.1			
23	1,006,900	15,352	900	300	0,544	1,552	595		1,163	20	4,278	50.4	14.0	35.6			
24	1,569,113	216,524	7,250	2,940	58,422	80,163	16,029	1,850	5,819	28,855	15,196	31.7	44.4	23.9			

PERSONS ENGAGED IN INDUSTRY—continued.												PRIMARY POWER OWNED.						ELECTRIC MOTORS RUN BY CURRENT GENERATED BY THE ENTERPRISE USING.		MACHINERY.				
Wage earners employed 15th day of—												Total horsepower.	Steam engines.		Gas or gasoline engines.		Water wheels.		Number.	Horsepower.	Compressed air.	Other.	Steam shovels (number).	
Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		Number.	Horsepower.	Number.	Horsepower.	Number.	Horsepower.						
1	43,740	44,373	44,795	43,897	46,020	46,589	48,254	49,326	50,748	51,639	51,654	51,326	345,540	3,610	329,784	29	3,091	30	12,665	335	13,642	3,082	70	321
2	43,491	44,076	44,446	43,580	45,712	46,233	47,794	48,763	50,181	51,055	51,031	50,574	342,069	3,563	326,753	27	2,651	30	12,665	326	13,295	3,061	63	319
3	255	297	349	317	317	356	460	563	557	584	623	752	3,471	47	3,031	2	440	.....	.....	9	347	21	7	2
4	28,069	28,768	28,806	28,386	30,863	31,327	32,235	32,533	33,228	33,912	33,645	32,909	262,305	2,739	249,986	11	109	24	12,210	271	11,687	1,832	21	206
5	14,351	14,466	14,557	14,128	14,476	14,056	15,020	15,145	15,494	15,803	15,734	16,052	108,202	1,205	96,017	4	35	24	12,210	149	7,341	1,395	4	5
6	12,679	13,046	13,065	13,109	15,109	15,529	15,947	16,084	16,324	16,740	16,465	15,550	145,068	1,412	145,010	5	58	.....	.....	121	4,338	318	13	153
7	1,039	1,266	1,244	1,149	1,188	1,142	1,268	1,304	1,410	1,369	1,440	1,307	8,975	122	8,069	2	16	.....	.....	1	8	119	4	6
8	7,019	6,680	6,075	6,753	6,615	6,470	6,867	7,110	7,382	7,568	7,756	7,743	40,915	383	40,905	1	10	.....	.....	7	75	730	3	62
9	5,065	4,811	5,117	5,189	5,020	4,700	5,027	5,129	5,350	5,515	5,652	5,486	31,838	268	51,338	.....	.....	.....	6	50	670	.....	39	10
10	504	513	491	428	380	427	418	506	527	551	603	734	3,496	41	3,496	1	10	.....	.....	1	25	53	3	13
11	1,460	1,356	1,367	1,130	1,209	1,283	1,422	1,475	1,505	1,502	1,501	1,523	5,581	74	5,571	15	2,532	6	455	48	1,533	499	39	48
12	8,403	8,028	8,005	8,441	8,234	8,436	8,692	9,120	9,581	9,575	9,630	9,922	38,849	441	35,862	.....	.....	.....	.....	.....	.....	.....	.....	2
13	110	106	111	117	119	114	114	120	121	125	125	128	301	8	391	1	12	.....	.....	10	525	129	6	2
14	207	220	245	260	235	297	228	208	244	198	173	243	403	13	391	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	2,017	2,057	1,980	1,794	1,749	1,840	1,818	2,014	2,130	2,111	2,095	6,585	82	6,585	6	747	2	250	30	966	192	20	7	
16	1,885	1,922	1,909	1,832	1,792	1,884	2,008	2,175	2,333	2,353	2,387	2,510	18,220	124	17,223	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	20	27	33	34	31	31	31	31	35	33	31	31	31	38	2,257	4	1,714	.....	.....	.....	.....	.....	.....	8
18	533	508	437	513	408	491	508	531	509	648	637	696	200	2	200	3	53	9	205	1	20	74	9	25
19	75	75	75	75	67	67	67	67	67	67	67	67	2,932	141	6,200	.....	.....	.....	.....	.....	.....	.....	.....	4
20	2,590	2,688	2,793	2,733	2,602	2,605	2,703	2,950	3,019	2,753	2,837	2,932	2,621	33	2,615	1	6	.....	.....	7	22	78	4	4
21	960	1,025	1,022	1,090	1,110	1,162	1,193	1,220	1,239	1,268	1,281	1,239	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
22	183	205	220	225	221	240	260	292	339	352	385	534	1,724	31	1,724	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	4	7	6	.....	.....	.....	84	105	62	74	62	48	102	2	102	.....	.....	.....	.....	9	347	4	.....	.....
24	68	85	123	90	110	110	160	166	166	176	170	170	1,645	14	1,205	2	440	.....	.....	.....	.....	.....	.....	.....

* Includes 4 operators who are also included in the number shown for producing mines.

† Embraces Colorado, Connecticut, Kentucky, Massachusetts, Nevada, New Mexico, North Carolina, Texas, West Virginia, and Wyoming.

‡ Embraces Iowa, Michigan, Pennsylvania, Tennessee, Utah, Virginia, and Wisconsin.

§ Includes 1 water motor of 115 horsepower.

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